TOP QUALITY & READY TO FLY–OUT OF THE BOX!

# MODEL Airplane NEWS

## 25 BEST
NEW RC PRODUCTS FOR 2001

page 14

Lanier RC Staudacher

## Onboard Accessory Guide
EASY ADD-ONS

Build Uravitch's
## Giant Bronco


February 2001 AirAGE
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MODEL Airplane NEWS

FEBRUARY 2001 • VOLUME 129, NUMBER 2

*ON THE COVER: reviewer Jim Onorato wrings out his great flying, kit-built Lanier RC S600 Staudacher. Insets: the Hangar 9 Xtra Easy trainer goes from the box to the field in less than an hour and features an optional bomb or parachute drop, glider launch and camera mount; Rich Uravitch's giant OV-10 Bronco is a great twin-engine building project.*

## Features






## Construction



## Reviews




## Columns





## Departments

# EDITORIAL

BY DEBRA SHARP

# *The latest airplane releases*

ARFs continue to inject much vitality and excitement into our hobby. This year at the RC Hobby Trade Association (RCHTA) show in Chicago, we saw more new airplane companies offering more new ARF airplanes than ever before. Who could have imagined a 10-foot-span ARF de Havilland Beaver with a fully detailed interior or an ARF Curtiss Flying Boat with flying wires? These ARF models, offered by first-time show attendees Richmond RC and Smartt Pioneering Mfg., respectively, were the tip of the iceberg; see our special "Air Scoop Special: New for 2001" for the latest news on models and products that will hit hobby store shelves this year.

***When you combine one of America's most beautiful places with graceful, scale, slope-soaring models, you're bound to have some great photo opportunities. Photojournalist Dave Garwood brought his camera to Soar Utah 2000, a scale sailplane event that boasted more than 200 models. Dave's article and spectacular photos start on page 48.***

## BIGGER BRONCO

We announced in our January 2000 issue that master modeler Rich Uravitch intended to enlarge his 52-inch-span OV-10 Bronco to 81 inches, and we were inundated with emails and letters asking, "Which issue will it be in?" We're proud to feature Rich's latest twin project as a construction article in this issue. This unique, .46- to .60-powered plane has breathtaking flight characteristics, and we don't think Rich is exaggerating a bit when he describes his OV-10 as "... absolutely the easiest, the most economical to build, the most fun to fly twin-engine, flap- and retract-equipped, giant-scale warbird" that he has ever designed.

## COOL GADGETS

From gyros to fail-safes to fuel fittings, onboard model equipment can make your time at the field more interesting, more enjoyable and trouble-free. Gerry Yarrish's guide to onboard accessories this month gives you the lowdown on some of the best gadgets available, and tells why it's so smart to install them in your models. How about a camera mount that automatically advances a disposable camera? Or an autopilot that will make it easier for beginners to master the transmitter sticks? For the latest info on these and other cool products, see page 32.

## TISSUE COVERING RETURNS

Tried-and-true techniques have a way of coming back in-to fashion. Before plastic coverings were introduced in the '60s, most airplane models were covered with tissue and dope—light and attractive. With the growing popularity of small backyard, park and indoor flyers, covering RC models with tissue has come back into vogue. Check out Dave Robelen's modern techniques for working with this classic covering material (page 80).


MODEL Airplane NEWS

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# AIRWAVES

*Our readers write back*

**WRITE TO US!** We welcome your comments and suggestions. Letters should be addressed to "Airwaves," MODEL AIRPLANE NEWS, 100 East Ridge, Ridgefield, CT 06877-4606 USA; email man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we can not respond to every one.

### CAMOUFLAGE SKY SCOOTER

I thought the December 2000 article on the Sky Scooter was great! Just a couple of quick questions: which paint did Chris use for the camouflaged model? How did he mask the plane? I guess he painted the tan first, but did he use a mask of some sort or just paint the design freehand? I have always wondered how this was done. [email]

GENE ROBERTSON

*Gene, Chris is long on imagination but short on time, so he entrusted the painting of his Sky Scooter to me. The plane somewhat resembles the A-6, so we borrowed a scheme from Squadron Signals' "Intruder" book, and I used Parma's FasKolor to create the Euro camo theme. The paint is water-based, so it won't attack a foam model.*

*I masked the canopy lines first; then I applied an entire coat of Fasbeige as a base. Next came a freehand application of Fasgreen to create the camouflage pattern. Most of the modern fighters I've seen have this sort of long wavering pattern across their fuselage and wings. The darker colors on the full-scale planes have feathered edges and not a hard masked line, so, to simulate the same effect, I airbrushed the paint on from about 4 inches away. Once the paint had dried, I brushed Fasblack onto the canopy, removed the masking tape and then topped off the look with simple panel lines using a ruler and a permanent-ink marker. Thanks for your question!* BOB HASTINGS

### MICROFLIGHT ONLINE

I just received the printed version of *RC MicroFlight*, and I want to tell you how much I like the publication. I really like having both a print and an electronic version [www.rcmicroflight.com]. I like looking through the full-color electronic version and having downloadable plans, but there is nothing like sitting down and thumbing through a paper newsletter. I'm planning to build a Pond Baby when I get a good copy of the plan printed. Thank you; and keep up the good work. [email]

KOUROSH GHASSEMIEH

*Kourosh, one of the driving forces behind developing the electronic version of* RC MicroFlight


*was to have online archived articles and downloadable micro flyer plans. We're glad to hear that you enjoy both versions of the newsletter.* DS

### TROUBLED TAYLORCRAFT

I just want to point out that in the January 2001 issue, the opening photo of "Electric Power for Scale Models" is not a ¼-scale Taylorcraft; it is a Super Cub. This small error notwithstanding, I found the rest of Bob Benjamin's article very interesting, and I am now considering electric power for my

next scale project. Please consider publishing more articles on the basics of electric-powered models.

RALPH JOHNSTON
Kokomo, IN

*Ralph, you caught us! We do know the difference between a Taylorcraft and a Super Cub, but we mistakenly placed a photo of Phil Sibille's Super Cub with the caption for the impressive electric-powered Taylorcraft that Bob competed with at Top Gun 2000. Bob's model is shown here.* GY

### CLASS PROJECT

I am a technical studies teacher at the Prince of Wales High School in Vancouver, BC, Canada, and had long wanted to introduce an applied aerodynamics project. Eventually, I was in a position to do so with my senior technology class. My students had to build a Sun Rider RC glider (July 1998 *Model Airplane News*) from scratch and were given flight training on a simulator while working on their models.

My class of 22 built 12 gliders and used three Futaba Skysport RC systems and a Dave Brown flight simulator. I also had to make the Sun Rider fuselage wider and higher to accommodate the standard Futaba servo tray, as the students had to share trays.

We started the construction by making rib templates and cutting out ribs. After the students had been given some lessons in basic aerodynamics and flying structures, they learned to fly on the simulator. I programmed the Sun Rider into the simulator, and students found that it was quite close to its actual flight characteristics.

My fellow Okalla Hawks Club member Jim Porter came to give a wonderful demonstration of high-start launching and flying, and this invigorated the students (after all, this was a long project for high school).

***Left to right: students Andrew Chiu, Cody Burdett, Trian Groumatis and Stanley Chung with their Sun Riders.***

I was surprised at how well my students flew their gliders. I began by having them hand-launch and trim them on a hill behind the school. When I was satisfied that they could handle them safely, we used a high-start. Their efforts were rewarded with some very good flights. At least two students have bought their own radios, and all have a standing offer from the Okalla Hawks to fly as guests at their field.

All in all, it was a successful program, and it seems that much was learned and considerable expertise acquired. I hope to offer this program again at the Prince of Wales HS.

JOHN HANNAH
Vancouver, BC, Canada

*Thanks so much for sharing your project with us, John. I know that designer Jim Simpson will be very glad to hear that his glider design has introduced RC airplanes to another group of young students.* DS

AIR SCOOP SPECIAL

# New for 2001

*by the Staff of Model Airplane News*


The product offerings at the 2000 Chicago Hobby Show exemplified two very strong growth segments: small, fly-at-home park flyers and more complex, large ARFs. In our opinion, both of these segments are great for growing the hobby and bringing it more into the mainstream. You don't have to take our word for it; the excitement on the part of show attendees told the story loud and clear.

GREAT PLANES

## Popular "Poke" Concept

Inspired by the 1920s home-built Pietenpol, the Pete-N-Poke Sport 40 uses the same design and construction techniques as Great Planes' popular SlowPokes, but with a vintage, parasol-wing profile. This all-balsa kit can be assembled quickly and delivers relaxing, low-speed flight and basic barnstorming aerobatics. The kit features a CAD plan, photo-illustrated instructions, interlocking wooden parts and dual aileron servos. Specs: 59.5-inch wingspan; 809.2-square-inch wing area; weighs 5.75 pounds; 47 inches long; requires .40 to .46 2-stroke or .40 to .52 4-stroke and a 4-channel radio with five servos.

Also shown is O.S.'s new .15CV-A engine. This little screamer features: twin-needle carburetor; dual ball-bearing-supported crankshaft; and ABN piston and sleeve technology.

Great Planes Model Distributors, 2904 Research Rd., Champaign, IL; (217) 398-6300.

GLOBAL HOBBY

## Distributors Little Extra 300

This is Watt-Age's all-wood Extra 300 for Speed 400 electric power. Can't tell you too much about this little aerobat except that it features balsa and lite-ply construction, comes covered with film just as you see it here and requires a 4-channel radio.

Also shown is the Magnum XL .91A. Weighing 26 ounces, this new addition is touted as being "A large displacement in a small package," and like other Magnums, it features: twin-needle carburetor; remote main needle placement for safety; dual ball-bearing-supported crankshaft; and true ABC piston-and-sleeve technology.

Global Hobby Distributors, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 963-0133; fax (714) 962-6452.

SIG MFG.

## Sukhoi ARF

This SU-31 is the latest addition to Sig's relatively new line of all-wood ARFs. Hand-assembled using the latest CAD techniques, the Suk's structure is covered with Goldberg's Ultracote. For $599.95, the model includes a complete, heavy-duty, U.S.-made hardware package and fully illustrated assembly manual. Specs: 76.75-inch wingspan; 1,152-square-inch wing area; requires 1.50 to 2.1ci 2-stroke, 1.80 to 2.7ci 4-stroke, or 2.4ci gas/ignition engine.

Sig Mfg. Co. Inc., 401-7 S. Front St., Montezuma, IA 50171-0520; (641) 623-5154; (800) 247-5008.

SMARTT PIONEERING MODEL MFG.

## Curtiss flying boat ARF!

That's right; this beauty is an ARF. This company is called "Smartt," and it chooses truly unique and complex subjects. Another ARF in its line is a Fokker triplane. We'll keep you posted.

Smart Pioneering Model Mfg., Flat A, 13/F, Federal Centre, 77 Sheung On St., Chai Wan, Hong Kong; (852) 2187-2622; fax (852) 2539-4748/ 2187-2621; lokpong @ctimail.com.

WORLD MODELS'
## Miss America

This 80-inch-span Miss America Mustang is being held by international customer service rep. Carly Kong. This all-wood-construction, large P-51D ARF comes with a prepainted pilot, a canopy and a fiberglass cowl, and it features a detachable two-piece wing and a detachable stabilizer, pull/pull controls, retracts and an anti-vibration engine mount. With 1,115 square inches of wing area and a projected weight of only 13 to 14 pounds—that's a wing loading of only 27 to 29 ounces per square foot—this giant-scale Miss America should fly as great as it looks.

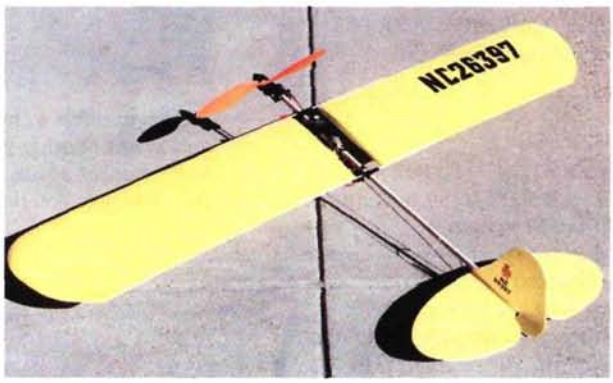
Also shown is World Models' new .46 to .61 Corsair ARF. The F4U features a fiberglass fuselage and rotating retracts.

Distributed by AirBorne Models, 2127-H S. Vasco Rd., Livermore, CA 94550; (925) 371-0922; fax (925) 371-0923.

RICHMOND RC
## Bush Pilot Alert! 10-foot Beaver

Does a 10-foot-wingspan, all-wood de Havilland Beaver ARF turn you on? I know it turns this bush pilot on. It looks all too perfect for my Saito 1.70 radial. Can't tell you much about it now—except its price: $399.98—but look for its release in early spring, followed closely by a set of matching floats.

Richmond RC, #114-7350 72nd St., Delta, British Columbia, Canada V4G 1H9; USA toll-free (877) 727-2329; fax (877) 727-2289; or (604) 940-1066; fax (604) 940-1063.




GWS
## Lawn Cub

The new 7.5-ounce Pico J-3 Stick (left) is GWS's answer to requests for a Piper Cub slow flyer. The J-3 Stick has a spruce-stick fuselage, foam wings and tail surfaces, molded wing mounts and radio-mounting hardware. According to its distributor, Horizon Hobby, you'll have this one flying in two hours, and you'll enjoy more than 13 minutes of flying time. Specs: 41.3-inch wingspan; 263-square-inch wing area; 3.6-ounces-per-square-foot wing loading; requires an IPS SXBB AX for power.

Also shown (right) is the new Pro .78 that joins the MDS line. At 18.6 ounces, the new MDS Pro .78 weighs about the same as most .61 2-stroke engines but offers a 22-percent-larger displacement. With its new MKII Series muffler, noise is reported to be very low, even near or at the 11,000rpm mark. Running an APC 13x6 prop, rpm levels of 10,500 to 10,600 are claimed. Its features include a ringed piston, dual ball bearings and a twin-needle carburetor.

Horizon Hobby Distributors Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511.

FMA DIRECT
## Extreme 5 receiver

This is FMA's high-end receiver with


fail-safe; it has a 5-channel capability that makes it good for scale projects, while its size makes it at home in all models. Bonus: dual-conversion circuitry helps reduce the chance of glitching.

FMA Direct, 9607 Dr. Perry Rd., #109, Ijamsville, MD 21754; (800) 343-2934; fax (301) 831-8987; www.fmadirect.com.

AIR SCOOP SPECIAL

# New for 2001

EZ OK MODEL CO.

## Hide-Away 30/50

Designed by world champion F3A pilot Chip Hyde, the new Hide-Away 30/50 ARF features sweptback fixed landing gear but can be converted to retracts. Specs: 52.8-inch span; 538-square-inch wing area; 55.8 inches long; weighs 83 to 86 ounces; requires a .32 2-stroke or .52 to .61 4-stroke engine.

EZ OK Model Co.; distributed by Altech/MRC, 80 Newfield Ave., Edison, NJ 08837; (732) 225-6144; www.model.rec.com.

NORVEL

## GlassAir SeaEasy ARF

This all-fiberglass ARF Seaplane is a perfect match for Norvel's .061 or .074 engine. Because it's so light, the SeaEasy can easily take off from small ponds, and it can be hand-launched, too. Specs: 43.3-inch span; 33.8 inches long; weighs 23 to 28 ounces; requires 4 channels; price: $149.99.

Norvel has also added a .24-size engine to its Revlite engine line. It features a ceramic cylinder and piston and has plain hydraulic ball bearings.

Norvel, P.O. Box 3459, San Luis Obispo, CA 93403; (800) 665-9575/(805) 547-8365; www.norvel.com.

MULTIPLEX USA

## *Cockpit Master* flight sim

Featuring 23 popular real-life RC models ranging from Clancy's Lazy Bee to Sig's giant CAP 232, this $79.95 flight sim offers a choice of eight runways, six training scenarios and a host of other variables, and its online capability allows you to fly combat against other RC'ers over the Internet! (TX interface: $34.95). You have to see it to believe how realistic it is.

Multiplex USA, 560 Liberty St., San Fernando, CA 91340; (800) 375-1312/(818) 838-6467; www.multiplexrc.com.

AIRTRONICS

## RD6000 Super

The RD6000 Super 6-Channel PPM/FM system is ideal for sport and advanced fliers who are looking for top features in a computerized radio system. The detailed LCD screen is one of the largest available on a radio in its class. Rumor has it that, with its unique basic and advanced software choices, this may be the easiest radio to program. When the advanced menu is turned on, you'll find a vast assortment of features for airplane, helicopter and sailplanes. The RD6000 Super's features include: 8-model memory; three-position flap switch; digital trims; Sanyo transmitter and receiver batteries; LCD display; throttle cut switch; trainer system; advanced and basic programming; helicopter, aircraft and sailplane software; PPM/FM/PPM/FM-invert/PCM1/PCM2 modulation; hover pitch and throttle adjusters; three flight modes in helicopter; and Slim Line micro dual-conversion 7-channel FM receiver; and many servo combinations are available—all for $489.95.

Airtronics, 1185 Stanford Ct., Anaheim, CA 92805; (714) 978-1895; fax (714) 978-1540; www.airtronics.net.


KANGKE INDUSTRIAL USA

## F3A 90

Go to the field in style with Kangke's new all-fiberglass, prepainted Sport 2001 aerobatic ARF. Designed for a .61 to .91 2-stroke or a .91 4-stroke, the F3A 90 has plug-in wing halves and weighs around 8 pounds. Specs: 61.8-inch wingspan; 870-square-inch wing area; 59.4 inches long; requires 4-channel radio with five servos; $347.

Kangke Industrial USA, 65 East Jefryn Blvd., Deer Park, NY 11729; (631) 274-3058; fax (631) 274-3296; www.kangkeusa.com.

AIR SCOOP SPECIAL

# New for 2001

HITEC RCD

## Eclipse 7 FM radio

How would you like 7 channels and a 7-model memory along with programming options for glow, gas and electric planes, sailplanes and helicopters for $285? Of course, you'll also get endpoint adjustment (EPA), dual rates, exponential rates, sub-trims and servo-reversing. Add three flight conditions per model memory, five programmable mixes, preprogrammed mixes, and more—whew! Like the Prism 7X, Hitec's Eclipse is compatible with the Spectra frequency-synthesizer module.

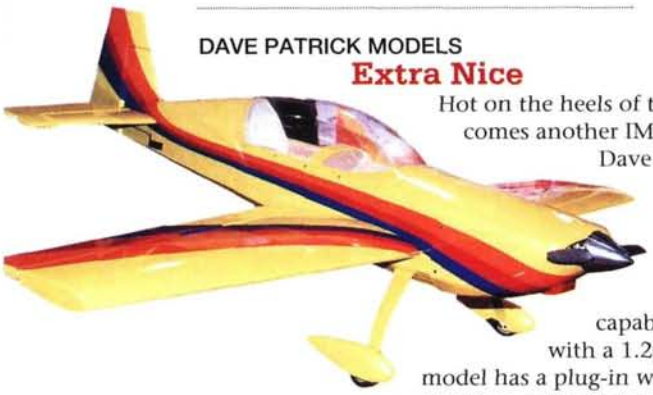
Hitec RCD Inc., 12115 Paine St., Poway, CA 92064; (858) 748-6948; www.hitecrcd.com.

Thunder Tiger

## Lazy Cub

Never to be left behind in any market, here's a new ARF from Thunder Tiger. First up, joining the Lazy "squadron" is the Lazy Cub. This all-wood model has amazing slow-flight characteristics yet, with its low aspect ratio wing and generous control surfaces, it will do totally outrageous maneuvers. Specs: 53-inch wingspan; 675-square-inch wing area; weighs 2.5 to 3.5 pounds; requires .20 to .30 2-stroke or 4-stroke engine.

Ace Hobby Distributors Inc., 116 W. 19th St., Higginsville, MO 64037; (660) 584-7121.



DAVE PATRICK MODELS

## Extra Nice

Hot on the heels of the Ultimate Bipe comes another IMAA-legal ARF from Dave Patrick. The new Extra 330L has the same high-quality fiberglass construction and will be a very capable 3D flyer with a 1.20 or 1.40. The model has a plug-in wing and stabilizer, adjustable stabilizer incidence, heavy-duty engine mount, high-quality hardware and a very detailed construction manual. Specs: 76-inch wingspan; 1,205-square-inch wing area; 74 inches long; weighs 11 pounds.

Dave Patrick Models, 1811 E. 400 North Rd., Milford, IL 60953; (815) 457-3128; fax (815) 457-2938; www.modelmagic.com.



CARL GOLDBERG MODELS

## Decathlon ARF

It's hard to beat a classic design that offers great aerobatic performance. The new Decathlon ARF comes covered and detailed with Ultracote and includes landing gear, painted fiberglass cowl and wheel pants, wheels, fiberglass pushrods, wing struts, fuel tank and a spinner. Specs: 80¾-inch span; 969-square-inch wing area; weighs 9½ to 10½ pounds; requires .61 to .75 2-stroke or .70 to .90 4-stroke and a 4-channel radio.

Carl Goldberg Models, 4734 W. Chicago Ave., Chicago, IL 60516; (800) FLYING; fax (773) 626-9566; www.goldbergmodels.com.


MEGATECH

## Fly in minutes with Merlin

Megatech's new Merlin Slow Flyer is built and ready to fly, and it costs only $199.99. Simple to assemble in just minutes, the Merlin features: ball-bearing gearbox with 12-inch prop; lightweight NiMH battery pack; peak-detection charger; and 3-channel transmitter. Easily flown in small areas, the Merlin is a great introduction to the simple and fun world of slow-flyer and park-flyer RC flight. Specs: 44-inch wingspan; 465-square-inch wing area; weighs 15 ounces; uses 12x8 propeller; 5.6:1 gear ratio; 600mAh NiMH battery pack; elevator, rudder and throttle functions.

Megatech, 8300 Tonnelle Ave., North Bergen, NJ 07047; (201) 662-2800.

NORTHEAST SAILPLANE PRODUCTS

## Ellipstick ARF

Tom Hunt's famous, highly aerobatic Ellipstick is now available in an ARF version costing only $119.95. Although the model was slightly modified to be produced as an ARF, it weighs less than the kit! It also comes with a 6V, 280 motor and a prop.

Northeast Sailplane Products, 948 Hercules Dr., Ste. 12, Colchester, VT 05446; (802) 655-7700; www.nesail.com.

# HINTS & KINKS

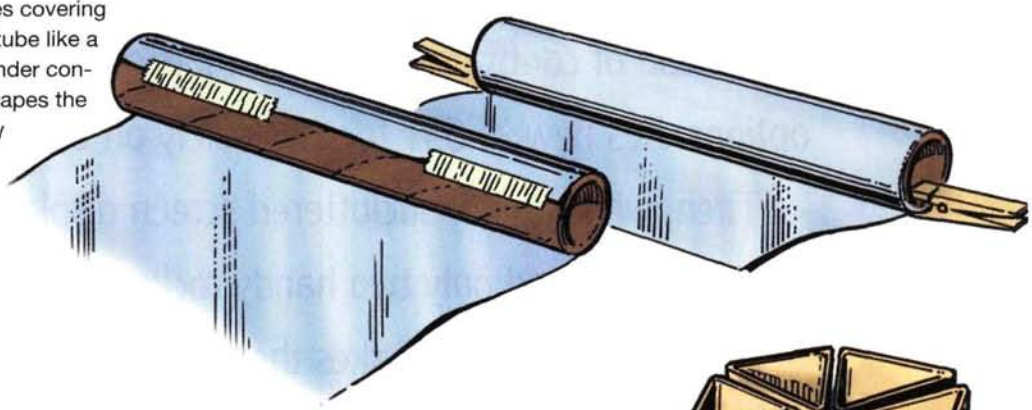
BY JIM NEWMAN

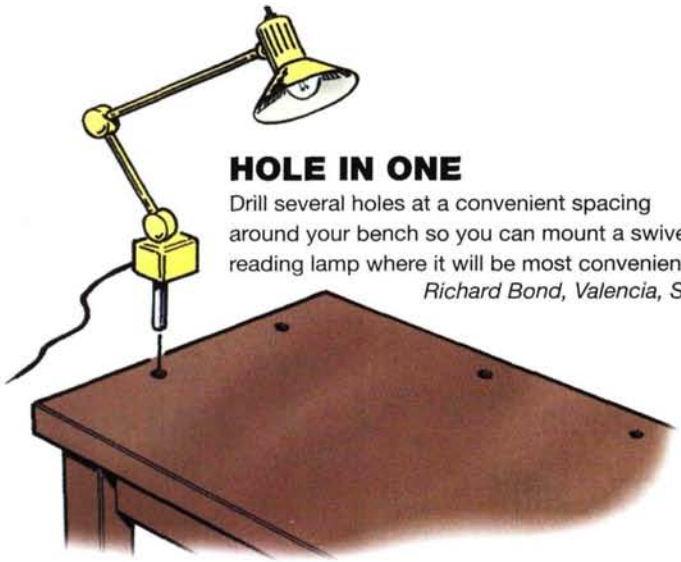
**SEND IN YOUR IDEAS.** *Model Airplane News* will give a free, one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman, c/o *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.

## OBNOXIOUS COVERING

That is how our contributor describes covering film that unwinds off the cardboard tube like a clock spring! To keep the material under control, he unwinds it completely, then tapes the end of the film to the tube. He tightly rewinds it, then secures the ends with a pair of clothespins, leaving enough loose film with which to work.

*Warren Gillette, Elkridge, MD*

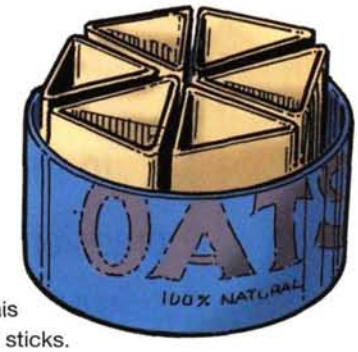




## HOLE IN ONE

Drill several holes at a convenient spacing around your bench so you can mount a swivel reading lamp where it will be most convenient.

*Richard Bond, Valencia, Spain*




## SHORT SHORTS

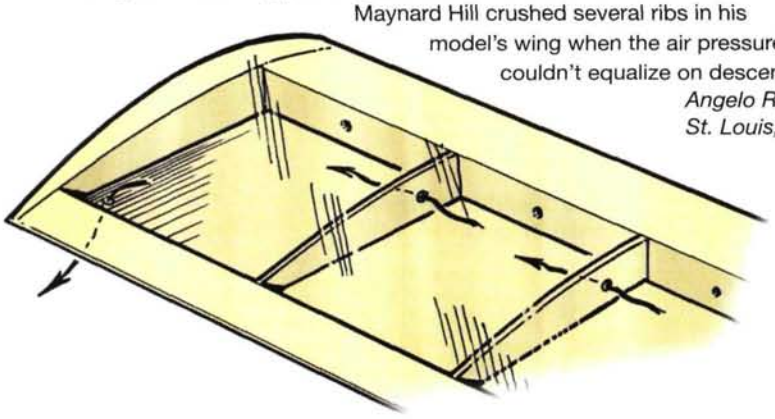
It took the unaided consumption of three Toblerone chocolate bars, says Eric, to create this holder for short scraps of balsa sticks. The triangular tubes are stuffed into the cardboard tub cut from a breakfast-cereal container. Many of the short pieces can be used in conjunction with the triangle stock tool also shown in this column.

*Eric Marsden, Horndean, Hampshire, England*

## BREATHING EASY

Drill 3/32-inch-diameter (2.5mm) holes through the ribs and spar webs along the length of the wing, then pierce a small hole in the covering at the tip or in the center section. The wing will be able to vent expanded air on a hot day or when the plane is descending rapidly from a great height. Note: many years ago, noted modeler and altitude record-holder Maynard Hill crushed several ribs in his model's wing when the air pressure couldn't equalize on descent.

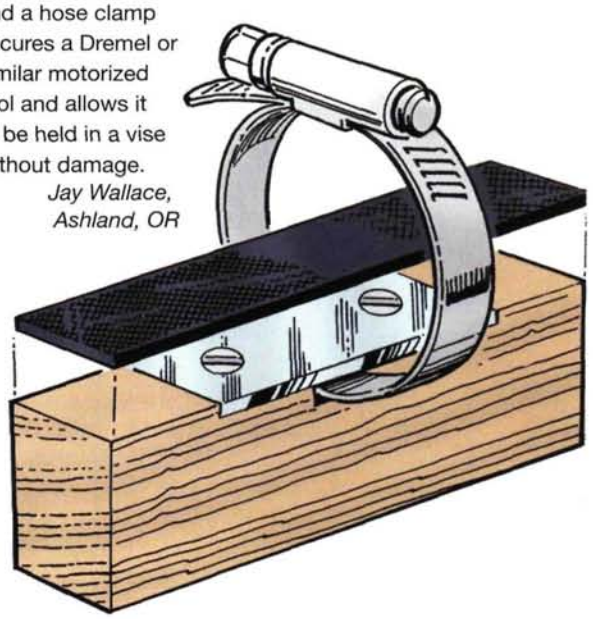
*Angelo Rossi, St. Louis, MO*

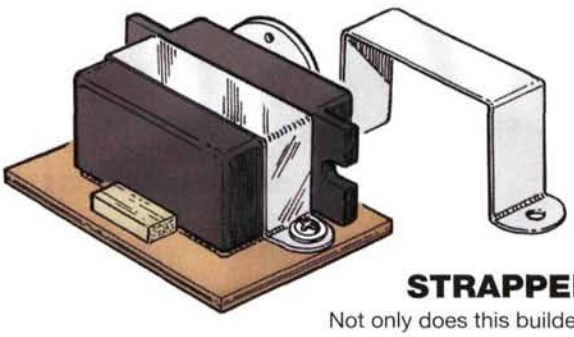


## MOTORIZED TOOL MOUNT

This simple mount made from a wood block, 1/16-inch (1.5mm) aluminum strip, rubber sheet and a hose clamp secures a Dremel or similar motorized tool and allows it to be held in a vise without damage.

*Jay Wallace, Ashland, OR*





## STRAPPED IN

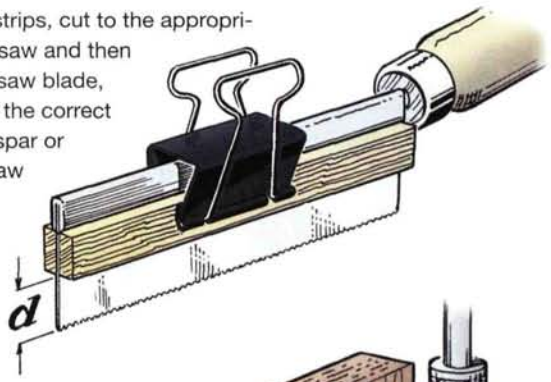
Not only does this builder use double-sided tape to hold his side-mounted servos in place, but he also cuts a little strap from an aluminum soft drink can, bends it to shape with pliers, then screws it to the platform over the servo. Thin foam tape between the strap and the servo will help it to stay snug.

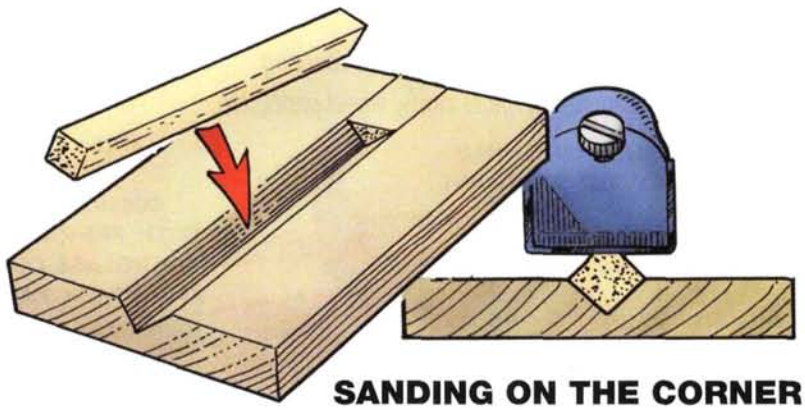
*George C. Scrimshaw, Carmel, CA*

## DEPTH CHARGE

A pair of hardwood strips, cut to the appropriate width on a table saw and then clipped to the razor-saw blade, will provide you with the correct depth of cut "d" for spar or stringer slots. Just saw until the hardwood stops touch the rib or the former.

*Jerry McLish, Bradenton, FL*

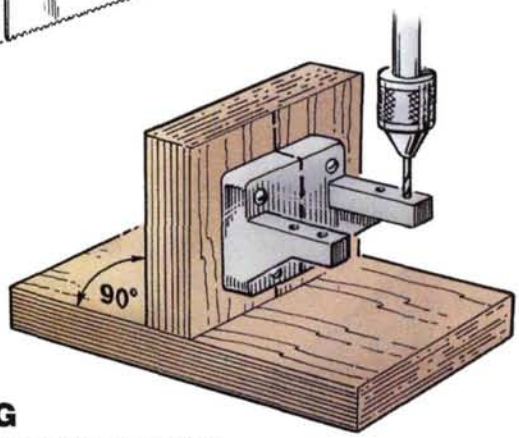


## SANDING ON THE CORNER

When you need corner—or triangle—stock, it's often for corner reinforcement, so use your short scraps of square stock. Saw or rout a 90-degree V-groove in a short, flat board; glue a stop at one end of the groove; then drop your scrap stick into the groove, and plane down until it stops on the board. Now you have a piece of triangle stock.

*George Thompson, Napanee, Ontario, Canada*




## HI JIG-A-JIG

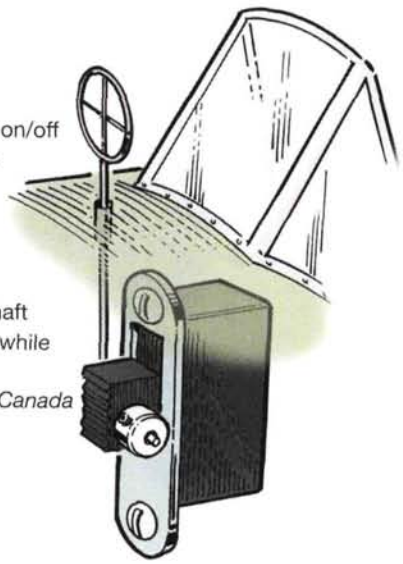
Use a table saw to accurately cut ¾-inch (19mm) ply or chip board to size, then glue the parts together to create a drill jig for motor mounts. Screw the mount to the jig; make sure that it's properly aligned and that it will be securely held while you use the drill press. You'll be able to use the jig several times before discarding it.

*Harold Marenburg, Orlando, FL*

## ON TARGET

Another method of disguising the on/off switch is to turn the push/pull rod into a gunsight. Set it up so that you push it on and so that you won't push the switch to "off" as you release the model. A modified clothespin around the shaft prevents an accidental switch-on while you transport the model.

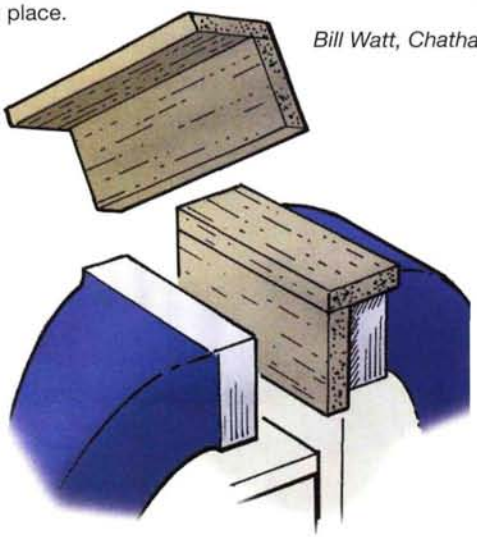
*Jack Dundas, Ridgeville, Ontario, Canada*



## SOFT JAWS

When you need to hold something really delicate in that big machine vise, CA together some very soft jaws from scrap balsa. A piece of sticky tape holds the jaws in place.

*Bill Watt, Chatham, NJ*



# PILOT PROJECTS

*A look at what our readers are doing*

**SEND IN YOUR SNAPSHOTS.** *Model Airplane News* is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.


## TIME FLIES

John Klimesh built this Great Planes Easy Sport .40 in his home in Mabel, MN, during the long winter. To take advantage of the beautiful nearby lakes, John installed Great Planes floats mounted on homemade aluminum gear. He reports that the plane flies equally well off land and water, and for a little extra fun, John installed flaperons and bomb drops, with bombs made from painted soda bottles that float easily. This is one of 19 planes John has ready to fly! With four more planned for this winter, the skies around Mabel will be busy come spring.

## I GOTTA BEE ME

John Koval of Washington, PA, wanted more buzz for his buck, so he thoroughly modified his Clancy Aviation Lazy Bee kit. John extended the wingspan from 48 to 54.5 inches, he oversized the rudder and elevator by 3/16 inch and covered the stab-to-elevator gap to enhance low-speed response. He beefed up the

structure with bolt-on wing struts and lowered the motor mount 3/8 inch. Last, John fabricated a custom dropped-axle front suspension 3 inches below the standard location. John reports that his modifications make the Bee fly even slower and easier than before.

## ELECTRIC TEMPEST

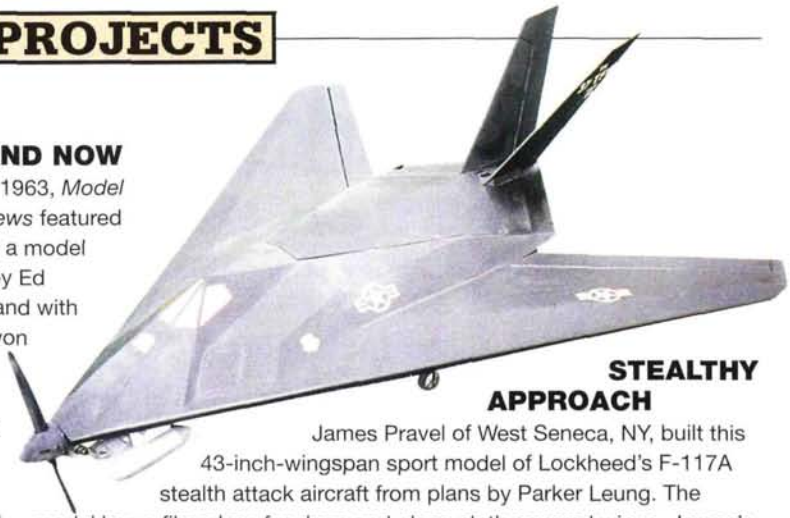
Ron Daniels of Kitchener, Ontario, Canada, displayed this little Hawker Tempest Mk. V electric model for several years before making it airworthy. This 1/12-scale warbird's wingspan is 41 inches, and it is built from a Trillium Balsa kit (now available from Hobby Hangar). It weighs 2.6 pounds flight ready and is powered by an AstroFlight 035 with 2.38:1 gears turning a 9x8 prop. Ten 800 AR cells provide the juice for 3½ minutes of high-performance flight, or longer for more relaxed cruising.

## GIANT SCALE AROUND THE WORLD

Yohan Poonawalla sent us this photo of his giant Giant Telemaster all the way from Pune, India. Yohan tells us that this plane and its sister ship, with wingspans of 14 feet, are the largest in India, and he scaled up the original plans using CAD. A 9-cylinder Technopower radial engine powers the 31-pound plane, while its sibling uses a 74cc Zenoah twin. Both planes are balsa and plywood reinforced with composites and covered in fabric. The finish is automotive paint, and the tires are 6-inch inflatables. Yohan is now working on a large-scale Super Piper Cub with a wingspan of 30 feet, and he hopes it will be the largest RC model in the world!

## THEN AND NOW

In January 1963, *Model Airplane News* featured the Taurus: a model designed by Ed Kazmirski and with which he won the 1961 national pattern competition. Jerome Parker of Hillsborough, NC, liked it so much that he built his own but then couldn't afford an engine for it. He sold it so that he could see it fly, and he promised himself he'd build another one. More than 35 years later, Jerome fulfilled that promise with this plane. It has Airtronics radio gear and an O.S. 52 4-stroke swinging a 12x6 prop.



## STEALTHY APPROACH

James Pravel of West Seneca, NY, built this 43-inch-wingspan sport model of Lockheed's F-117A stealth attack aircraft from plans by Parker Leung. The model has a fiberglass fuselage and glass-cloth covered wings. James's budget is slightly smaller than the Defense Department's, so he opted for *Magnum .46 power instead of General Electric turbofans. James incorpo*rated mechanical retracts, and Futaba radio gear controls the elevons. Formula-U paint and custom graphics provide the required stealthy look.

## GOOD OMEN

Rick Brown built his F4U Corsair—"Omen Over Okinawa"—from the Top Flite Gold Edition kit. Rick, of Furlong, PA, powers his Corsair with a Saito FA 91S spinning an Airmaster 14x6 prop. Operational flaps and retracts are nice touches on this 9-pound warbird, but the real treat is the finish. Rick covered his model in silkspan and airbrushed on Sig dope and all the markings. To keep weight down, he chose not to fully sheet the wings with balsa; instead, he covered the outer ribs with silkspan. Rick reports that Top Flite models fly great as long as you "keep 'em light and build 'em right."

### FIRST-TIME CONVERT

Gifford Hamilton of Dewey, AZ, was hesitant to get into RC because of all the mess with glow engines, but a friend convinced him that electric power was the way to go. Not one to shy away from a challenge, Gifford decided to convert a gas kit to electric for his very first project, and this Sig Senorita is the result. Remarkably, he kept the weight of this 63-inch-span plane to 4 pounds—that's just ¼ pound more than its gas flying weight.

### TRUSTY STEED


Ted Foster of Salem, OR, built this OV-10 Bronco from plans that appeared in Rich Uravitch's November 1995 *Model Airplane News* article. Ted uses two Thunder Tiger .25s to power his 52-inch-wingspan model, and he relocated the aileron servo to the nacelle with only two servos—giving three in each—for balance. Ted says the plane flies better than his J-3 Cub, and he didn't even have to change the trims on the first flight.

### SNAKE BIT

Robert Coats of Raleigh, NC, built this beautiful biplane from plans of a scale midget racer called "Cobra." An O.S. FT 300 provides plenty of power for Robert's bipe that weighs in at a little under 20 pounds. The most striking thing about this plane is its finish; Robert used Du Pont Chromabase paints topped off with a neat mix of graphics. And check out the instrument panel detail under the painted canopy!

# *A Guide to* ONBOARD ACCESSORIES

by Gerry Yarrish

## HOT GADGETS and why you need them!

***Right: the JHM Aero Engineering* DSG 2 solid-state ignition system uses MOSFET technology to improve idle and make it easier to start multi-cylinder engines. Using an onboard "D" cell battery and a Y-harness, the DSG system (available in several versions for up to five cylinders) plugs into your receiver and eliminates the need for separate glow drivers. Price: DSG 2 unit, $29; complete single-cylinder package, $66.***

When the basic hardware and equipment have been sorted out and your model is flying, the never-ending search begins for those "must-have" add-ons. Onboard accessories—also known simply as "the cool stuff"—make flying more fun. They can make your model's power system safer, and they can add redundancy to critical control surfaces and power supplies. Electronic accessories can add or reverse control features and responses that standard 4-channel transmitters cannot provide, and this gives you a greater choice of models to enjoy. From simple fittings and gadgets to sophisticated microprocessor-controlled electronic modules, onboard accessories broaden the scope of modeling—and they're just "plane" cool to use.

Obviously, we can't touch on every type of onboard accessory that's available: there are simply too many to count, and new ones are being added daily. From servo reversers and bomb drops to glider cradles, aerial cameras and fuel-level sensors, the list of add-ons for your modeling fun is endless. Check out what's available, and start having fun.

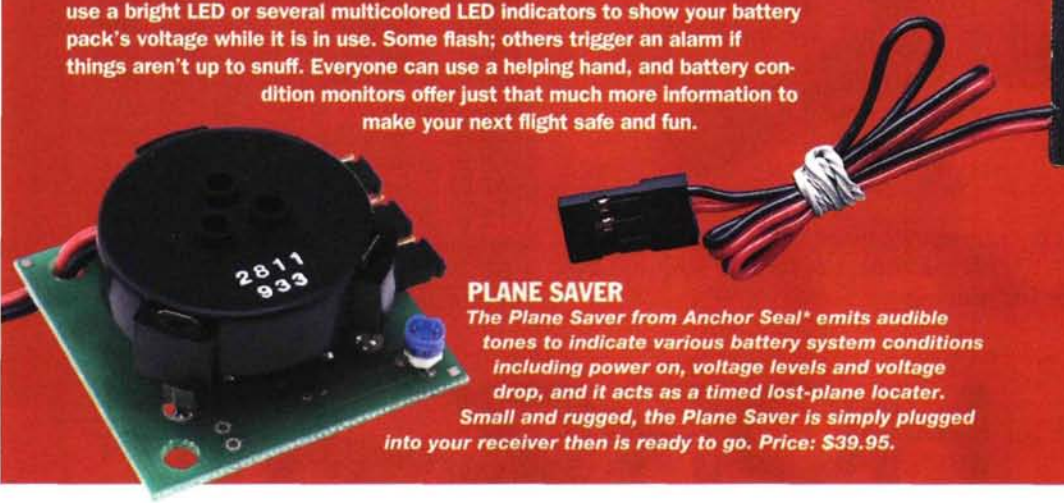
### GEM 2000

***The GEM 2000 from Electrotek* monitors your battery system by emitting various flash patterns (strobing, steady, or dark) via a bright red LED to indicate the condition of your battery pack. The unit also indicates whether there are any undue current drains in your radio system. Price: $39.95.***


## BATTERY BACKUP SYSTEMS AND CONDITION MONITORS

**Battery backup systems give your model a second chance if the primary power system fails to keep your receiver alive. Remember: a battery is only as good as its weakest component, and that can often be a damaged or worn switch. It's a good idea to cycle battery packs, but even doing that can't prevent all types of battery-system failures. If you have invested a lot of time and effort in a beautiful scale model, or if you race a very fast, giant-scale unlimited, a battery backup system is required insurance for the life of your model.**

**A battery condition monitor is a convenient way to keep constant tabs on your airborne battery pack. A simple glance before each flight lets you know that everything is A-OK for takeoff—for this flight, at least. Some monitors use a bright LED or several multicolored LED indicators to show your battery pack's voltage while it is in use. Some flash; others trigger an alarm if things aren't up to snuff. Everyone can use a helping hand, and battery condition monitors offer just that much more information to make your next flight safe and fun.**




### PLANE SAVER

***The Plane Saver from Anchor Seal* emits audible tones to indicate various battery system conditions including power on, voltage levels and voltage drop, and it acts as a timed lost-plane locater. Small and rugged, the Plane Saver is simply plugged into your receiver then is ready to go. Price: $39.95.***

***The Hobbico* VoltWatch uses seven LED lights to provide constant battery-voltage status. Only 1/8 inch thick, the unit weighs 0.10 ounce, plugs into any open receiver channel and can be installed anywhere on or in your model so you can see the indicator lights. Price: $10.99.***

# ONBOARD GLOW DRIVERS

Self-contained glow-plug drivers are a very neat way to both improve safety and increase your engine's reliability when you bring your plane in for a landing. Several units are available, from a simple on/off switch to adjustable systems that can be set to turn on and off at specific throttle settings. Scale modelers like these systems because they don't have to cut a hole in the engine cowl to attach a glow-plug-driver battery to start their engines. They simply flip a switch, and the engine is "alive" and ready to start. Not having to connect a starter to the engine also eliminates having to work near the prop. When you also use an electric starter, your fingers won't get close to the prop. I set up my glow driver to come on from idle to about ¼ throttle, and it shuts off at any setting above the ¼ setting. This saves the driver battery for landings, when you want a really reliable idle. The more I use my onboard glow driver, the more I want one in all my models. They do make a difference.


***The Expert Electronics* Digital Glow Driver ignites your glow plug when the throttle is moved below a predetermined set point. The unit will work on single- and twin-cylinder engines. It features push-button settings and an LED indicator to make setup quick and easy, and it can be used with your 1, 4, or 5-cell packs at 1.2, 4.8, or 6 volts. Price: $59.95.***


## DSG 2 IGNITION SYSTEM

## KAVAN ELECTRIC BRAKES

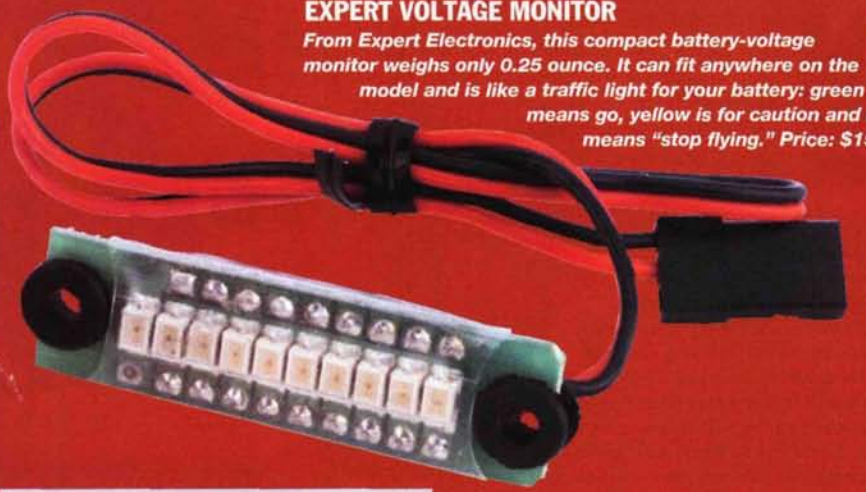
***If you have a scale model with tricycle landing gear, these Kavan* electromagnetic brakes make it super easy to stop quickly on a smooth runway. Powered by 4.8 to 9 volts, the brake drum slides onto the nosewheel's axle, followed by the brake disc and the nosewheel. A lock collar holds the wheel in place so there is a slight gap between the drum and the disc, and the drum pins engage the wheel-hub spokes. A switch is required to complete the package. Price: $34.20.***

## RC-CAM

***From Apex Hobby* comes the RC-Cam; a neat, self-contained unit that houses a disposable Kodak or Fuji camera and a single servo (not included) to make you a spy-in-the-sky! The RC-Cam is very easy to use and can take single or continuous shots using only one auxiliary radio channel. Price: $45, retail.***

## EXPERT VOLTAGE MONITOR

***From Expert Electronics, this compact battery-voltage monitor weighs only 0.25 ounce. It can fit anywhere on the model and is like a traffic light for your battery: green means go, yellow is for caution and red means "stop flying." Price: $15.95.***

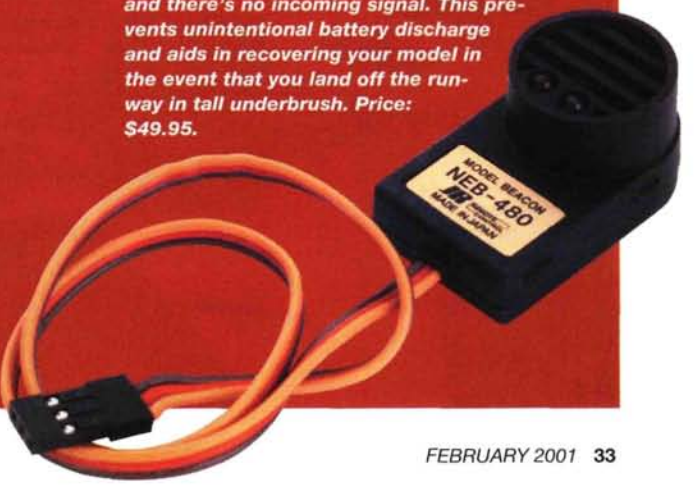



## AIR ALERT MONITOR

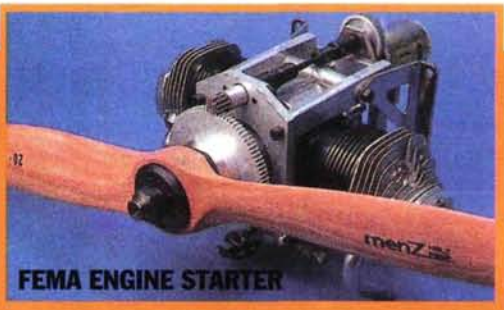
***The Hobbico Air Alert Flight Pack Monitor is a compact unit that monitors flight pack voltage levels and sounds an alarm if they drop too low. The unit also tells you if you have left your receiver switch on, and it acts as a lost aircraft alarm to make it easier to find a downed aircraft. Price: $25.99.***

## JR MODEL BEACON

***JR's* model beacon has twin LED lights that visually indicate battery condition. Green is tops, red/green means OK to fly, and red is for no-go. The unit's alarm signals when the receiver has been left on, and there's no incoming signal. This prevents unintentional battery discharge and aids in recovering your model in the event that you land off the runway in tall underbrush. Price: $49.95.***



# ONBOARD ELECTRIC ENGINE STARTERS



FEMA ENGINE STARTER

These are extremely high on my list of "very cool" onboard accessories. Comprised of a geared starter-motor, an on/off switch and battery, a couple of matching gears and a one-way clutch bearing, these trick accessories add the ultimate scale feature of push-button engine starts. Because of their weight, these systems are usually used only on giant-scale models, although systems are available for engines as small as .40 to .60 glow to big 60cc and larger gas burners. "My first maneuver will be an unassisted engine start!"—yeah, that's very cool!

***The FEMA onboard electric-engine starter is available from Hobby Lobby* and is a great addition to any scale or sport model that's big enough to handle the additional weight. This starter system is very well made and is powerful enough to start any engine, from .60 to .80 glow to large gasoline engines (.60- to .80-size shown). Price: $199 to $285.***

# FAIL-SAFE THROTTLE DEVICES

**Often used on powerful, giant-scale unlimited racers, these small, lightweight devices allow you to predetermine the throttle setting in the event that the radio link with your model is interrupted. Many high-end computer radios provide this safeguard as well, but having an onboard unit plugged between the receiver and your throttle servo provides this safety margin to any modeler, regardless which radio system is used. It's very easy to test these units before each flight; simply advance the throttle slightly (while someone holds your model) and then turn your transmitter off. A fail-safe device detects the absence of a transmitter signal and adjusts the throttle to its predetermined set point (typically, the idle setting). The only thing that's worse than an uncontrolled model is one that's uncontrolled at full throttle!**


***This Fail Safe throttle device, available from Nelson Hobby Specialties*, will bring your model's engine to idle if the transmitter signal is lost. The set point is adjustable, and it can be used with Futaba*, JR and Hitec* FM radio systems. Price: $39.95.***

# REMOTE GLOW-DRIVER RECEPTACLES

REMOTE DRIVER SAFETY LEADS

***Above: Hirobo, price: $20, below: Enya, price: $24.90.***

These accessories also keep your hands away from the engine area for increased safety. A small plug cap and a ground wire attach to the engine and lead to the glow-driver receptacle that you can mount anywhere on the fuselage. The standard glow-driver battery is then attached to the remote location, and the engine is ready to be started—neat, simple and safe.

In helicopters especially, remote-driver receptacles are often the only practical way to start the engine, which is often difficult to get to because it is shrouded by cooling ducts. For a sport model or a model with a scale engine cowl, this accessory can also make it much easier to energize the glow plug, and easier is better!

REMOTE SAFETY IGNITER

***The Du-Bro Remote Safety Igniter allows you to energize the glow plug without placing your hand near the engine and prop. The receptacle is attached to the fuselage a safe distance from the prop and can be glued into place. The wires attach to the glow plug and engine to complete the circuit. Price: $8.95.***

***With 12 years' experience in RC airborne video photography, WirelessVideoCameras.com* (an Internet-based business linked with PlaneTalk Airborne Video Systems) offers both commercial and hobbyist systems. Four airborne video systems are available, each with four color camera options. Two systems are specially designed for helicopter aerial video work, and two are for either fixed wing or helicopter use. The range on each model varies between 1,100 feet, 1 mile, 1.45 miles and 5 miles. The company also offers optional virtual-reality glasses that put you inside the cockpit while you take off, fly around and land—truly an exciting experience! The company also offers an ARF airplane/video system combo package at greatly reduced prices. Model combo prices: $598 to $688.***

AIRBORNE VIDEO SYSTEMS

# FUEL FITTINGS

Not all accessories have to be electronic to be convenient. Take the simple task of filling your fuel tank. If you have an engine cowl that covers the fuel lines, filling the tank becomes ... well, less simple. A fuel fitting, or "refueler" as they are often called, makes removing or even reaching for the fuel lines a thing of the past. Some have special fittings that simply plug into a fuel valve; others can be flipped to the "fill" or "run" positions. Attach your fuel-pump line and "Fill 'er up!"

For large and not-so-large models with three-line fuel systems, the third line must be sealed after fueling for the engine to run properly. Fuel-filler fittings or "fuel dots" are the answer. The outer part of the fitting passes through a hole in the fuselage, and a nut holds it in place. The filler line (the third line) passes through the fitting and is then capped with the "dot" cap. The cap seals the line and also fits nicely into the outer part of the fitting. Neat, simple and easy to use.

**SULLIVAN GENESYS**

***The Sullivan* Genesys is a multifunctional, engine-driven generator and control device. It operates navigation lights, a rotating beacon lamp, a strobe light and a remote switch for separate auxiliary functions. The system can also charge your receiver pack. Price: $129.95.***

***A standard item for many glow pilots is the Du-Bro* Fueling Valve and mount cover. It goes between the engine and the fuel tank where it attaches to the fuel line. The small nipple is attached to your fuel pump line and is inserted into the valve to fill or empty the tank. Price: $13.60 to $16.50.***

***These attractive fuel dots from Horizon Hobby Distributors* are gold-anodized and come with a fuel-line T-fitting. Simply cut the fuel supply line to the carb, add the T-fitting and install the dot on a long fuel-line extension; no third fuel line is needed. Price: $4.95.***

## CUSTOM CHANNEL MIXERS

Say you want to fly a V-tail airplane such as a Beechcraft Bonanza or a delta-wing model that requires elevon control, but you have only a standard, non-computer radio system. Do you have to go out and buy a new radio? Not if you don't want to; there are small, add-on control mixers available to do the same job as high-end radios do. To work properly, a V-tail model needs rudder and elevator mixed together, and models such as a Klingberg flying wing or a scale Me-162 Komet need elevons (aileron and elevator control mixed together). Simply plug the mixer module into the two channels that need to be mixed and then plug the servos into the module. Two companies that offer mixer modules are Cannon RC* and FMA. Some mixers offer fine-tuning so you can adjust the amount of each mix to obtain however much control you need. These units can also be used to couple flaps and elevators for fun-fly models and to couple flaps and ailerons for gliders. Use your imagination!

***The Ultra Fueler ($9.95) and Super Fueler ($7.95) fittings from Robart* go a long way toward simplifying your model's fuel plumbing. Both units fit through the fuselage and provide a convenient valve to tap into the fuel system. They can be installed quickly and easily.***

***Refueler fittings, or fuel dots, are a handy way to improve the looks of your model while adding convenience. These "dots" from PSP Mfg.* come with anodized finishes. Plug it in, plug it in! Price: $8.95.***

# GYROS

These little gems are very popular indeed. Almost every helicopter you see uses one to help tame the tail rotor. More sophisticated gyros, known as heading-lock gyros, are all the rage for top-of-the-line machines and are a must-have for those super 3D maneuvers. But gyros are not just for the heli set.

More and more, fixed-wing pilots are taking advantage of gyros to improve their models' performance. Rudder control is the first candidate for gyro enhancement; many high-performance models use them to help tame takeoff runs and landings. Gyros on rudders are so effective in calming down models that some contests have banned their use. But that doesn't affect the sport flier!

In the fast lane of ducted fans and turbine-powered jets, many modelers attach a gyro to the nosewheel steering servo to help smooth out their model's extremely fast ground run. How about those big, impressive, TOC-style models such as 40 percent Extras, Staudachers and CAP 232s? Some pilots have gyros on all their controls except the throttle. Though many of the top airshow pilots in the country choose not to use them, a few gyros aboard make hovering torque rolls and an array of other specialty maneuvers a lot easier to do. Heck, if it's good enough for those master pilots, it's good enough for me; my thumbs need all the help they can get!

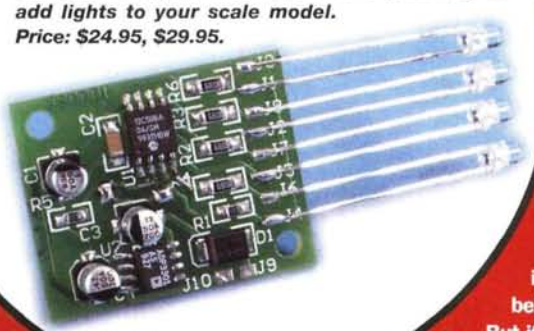

***The G90 piezo gyro and PC-1 remote switch module from FMA Direct* are affordable and lightweight and can be used with even the lightest helis or model airplanes. Easy to adjust and very compact, the system operates on the airborne battery pack and simply plugs into your receiver. The servo attachment Y-harness is also provided. Price: G90 $79.95; PC-1 $19.95.***


***The Hobbico Airplane Stabilizer is a piezo gyro especially designed for use with fixed-wing aircraft. It has two servo-output ports so it can be used with dual-aileron-control setups. The unit can also stabilize other control surfaces if the modeler so wishes. A built-in circuit cancels the gyro's sensitivity when the control stick is moved 50 percent of full deflection. Price: $119.99.***


***Intended for use with fixed-wing aircraft, the Expert Electronics EX-100 Aero Gyro with Aero Gain control measures barely 1 cubic inch and weighs just over ½ ounce. You can turn the Aero Gain unit on and off with an auxiliary channel, and this allows you to do aerobatics without the gyro fighting your control inputs. Price: $99.99.***


***The Futaba GY Series gyro features advanced technology and is made using silicon micro machining (SMM), which places mechanical elements, sensors, actuators and other electronics on a common substrate chip. It also has an active angular velocity control system (AVCS)—the equivalent of heading hold—that's more accurate and less susceptible to vibration than a conventional piezo gyro. The GY502 gyro is intended for 60-size helis and comes with a separate sensor and control amplifier, along with an LCD screen. Price: $279.99.***

***The J&S Resource* MicroStrobe is a very small LED strobe driver that can fit into the smallest model. The printed-circuit module operates on 6 to 28 volts and can be adjusted (with small jumpers) to emit several flash sequences. Available with white, red, yellow, white/red and red/blue LEDs, the MicroStrobe is a good way to add lights to your scale model. Price: $24.95, $29.95.***



# AUTO PILOTS

**These units are just amazing! They are perhaps the ultimate in pilot-training accessories. I know; many of you believe it removes the feel from the sticks. But if you think about it, the ability to allow a student to get into trouble with his model and then try to figure a way out of the situation will go a long way toward helping that student become a qualified RC pilot. Simply letting go of the sticks lets the model right itself. Couple this feature with a real instructor pilot standing close by, and learning to fly will become much easier.**

***"Look, Ma! No hands!" That's what you can say if you learn to fly with the Futaba PA-2 Pilot Assist Link autopilot system aboard your trainer. The PA-2 works automatically with an optical sensor to "see" the sky and horizon, and it corrects your model's attitude, keeping it straight and level. The system is fully adjustable; simply by moving your radio's control stick, you regain control. Price: $49.95.***

**PA-2 PILOT ASSIST LINK**


*Addresses are listed alphabetically in "Featured Manufacturers" on page 158.

# OV-10 BRONCO

by Rich Uravitch

*An easy-to-fly, giant-scale twin for everyone*

## SPECIFICATIONS

**Model:** OV-10 Bronco
**Type:** giant scale
**Span:** 81 in.
**Length:** 79.5 in.
**Wing area:** 1,215 sq. in.
**Weight RTF:** 13 to 15 lb.
**Wing loading:** 24 to 28 oz./sq. ft.
**Engine range:** .46 to .60 2-stroke; .70 4-stroke
**Engine used:** O.S. .46FX
**Channels req'd:** minimum of 4; 6 with flaps and retracts

**Comments:** absolutely the easiest, the most economical to build, the most fun to fly twin-engine, flap- and retract-equipped, giant-scale warbird that I have designed.

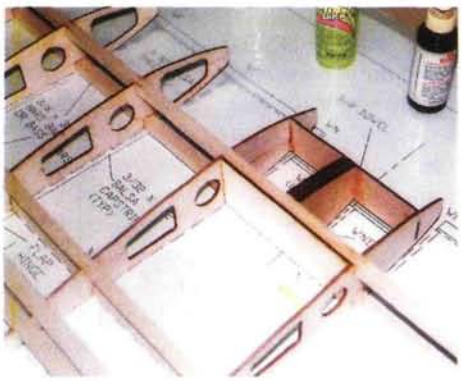
PHOTOS BY RICH URAVITCH

It's hard to believe that five years have passed since I designed the OV-10 in its original 52-inch-span version (*Model Airplane News* plan FSP11951). I designed it as a "first twin" for sport-scale fliers who might want to grab some "multi-engine" points without committing to a lifelong project or breaking the bank. It used a pair of "sport" .25s—O.S.* 25FPs—and flew very well, even with one engine out. A lot of them have been built by modelers who took the time to drop me a note to say how much they enjoyed it. Some even sent pictures; believe me, there are some very talented modelers out there! More often than not, they suggested that I should make a larger version, perhaps a .40 to .60—made sense to me; after all, it's generally accepted that "Bigger flies better" and that a lot of modelers have joined the giant-scale ranks. The question was just how big should I make it? Well, the magic number for the wingspan seems to be 80 inches. That's the monoplane span criteria established by the IMAA. I decided to take a look at a larger version that would, I hoped, fill the same bill as the original, i.e., it would be simple and affordable and designed for sport engines and inexpensive, off-the-shelf retracts.

Enlarging my original plan by about 50 percent made the wingspan what I wanted, but an 80-inch Bronco turns out to be very large because the real airplane has a relatively short span to begin with; its length is nearly the same as its span. So, could I make this 80-incher meet the same general criteria as its smaller predecessor? Some structural changes to beef up the wing, the incorporation of retracts and flaps, and a control-system modification were all it really took. I had a model that looked as if it would work! So if you've been considering trying a twin–one that satisfies a lot of requirements–you might want to take a close look at this project.

**IT'S A LOT EASIER THAN IT LOOKS ...**

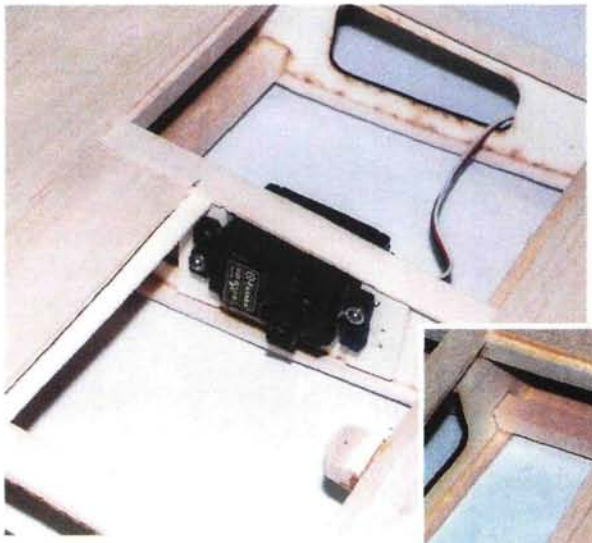
I can't give you a blow-by-blow description of each construction step, but I will touch on the unique or important issues. If you've built any of the box-style trainers so prevalent these days, then you already have most of the building skills required to frame up a Bronco. It basically consists of building three box-shaped fuselages and a constant-chord wing with no dihedral. This allows you to build the wing directly over the plan on a flat surface; just make certain the surface is flat. I drew the wing in two panels so that I could build them separately and then join them. To begin construction, I usually pin all the lower sheeting into place over the plan and then add the lower capstrips and the lower spars, followed by the ribs. In addition to providing a slightly more rigid structure, this method reduces the lower-surface sanding required to blend the sheeting with the capstrips.



***Pin the spars to the protected plan, add the ribs and start the sheeting. Assembly proceeds rapidly with the constant-chord, no-dihedral wing. Here's the wing at the nacelle attachment area; note the lite-ply spar web and laminated dowel receptacle.***

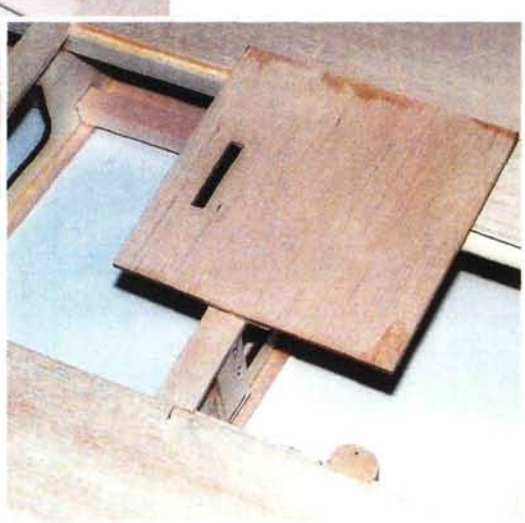
Prepare all the required laminated ribs, and install them along with scrap filler blocks, flap linkages and other items before proceeding with all the upper sheeting and capstrips. This is also a good time to fit the aileron and flap servos in their appropriate rib locations. You will need to tailor the openings in the ribs to suit your servo choices. These servos are mounted directly through the rib, and access is gained through removable panels in the lower sheeting. When mounting the servos, be certain to add a scrap of additional lite-ply to the rib to accept the servo-mounting screws. I also suggest that you fabricate some light paper tubes through which you'll run the servo-extension leads. Although there are holes in each rib for the wiring, it is a lot easier with a conduit installed. Add the upper sheeting, capstrips and sub-LE, and you've almost finished. Attach and shape the balsa LE; choose either balsa blocks or the vacuum-formed wingtips for installation; sand everything to a fairly smooth finish. Now it's time to cut away the flaps and ailerons. Cap their LEs and the openings created in the wing, then temporarily fit and install your favorite hinge system. Install the flap-interconnect linkage securely, and final-sand the wing.

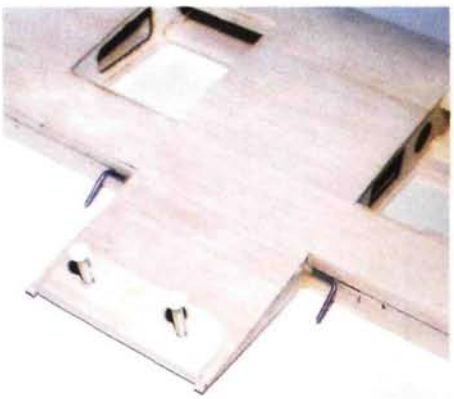
***The sheeting has been applied to the wing along with the LE and capstrips.***



***The aileron and flap servos are mounted directly on the ribs, as shown here. Cut the hole in the rib to fit your servo, and make sure to add scrap lite-ply under the servo-mount points.***

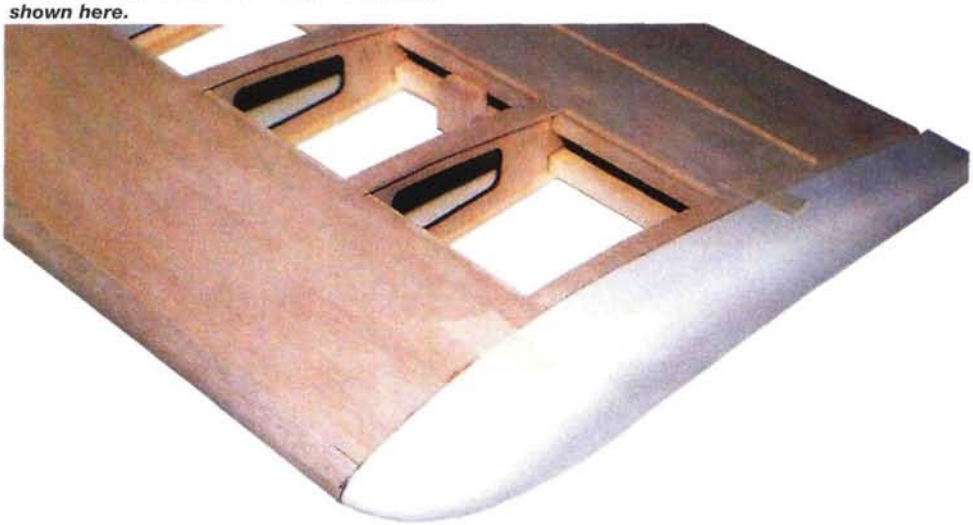
***The removable covers on the lower wing surface allow easy access to the aileron and flap servos.***





***The flap-interconnect linkage consists of a length of 1/8-inch music wire inside a brass tube bearing. Here you see the wing's right nacelle attachment point that uses a pair of 1/4-20 nylon bolts. Don't forget the lite-ply reinforcing plate for the bolts.***

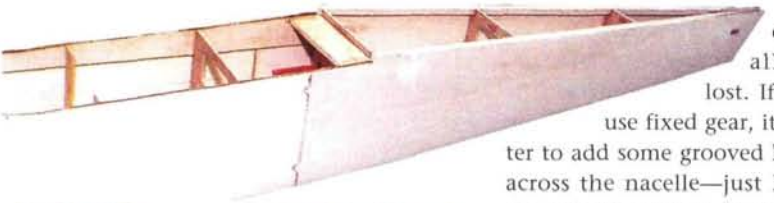
***You can carve the wingtips and hollow them out or use my vacuum-formed plastic parts, as shown here.***



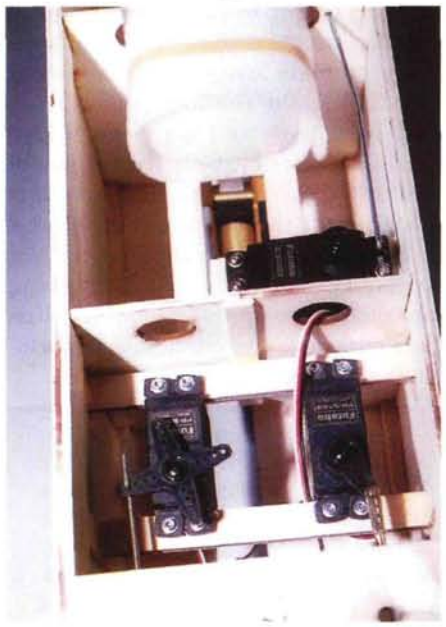
## FUSELAGE AND NACELLES

The fuselage and nacelles are about as easy to assemble as they come; they consist of lite-ply sides and bulkheads plus some longerons for strength and to allow you to round the sharp edges somewhat. Note that the fuselage formers (bulkheads) F4 through F7 are actually assembled from ¼x¾-inch lite-ply or basswood strips. The remaining bulkheads are cut from ⅛-inch lite-ply. When you install the bulkheads, make certain that they are square and that you haven't built any twist into the assemblies. The only bulkhead that should not be square is the right-hand nacelle firewall. It should be installed to provide 3 degrees of right thrust to help with those rare engine-outs.

Before you add the upper and lower 3/32-inch balsa sheeting to the nacelles, install the internal portion of the elevator and rudder pushrod linkages, which may be

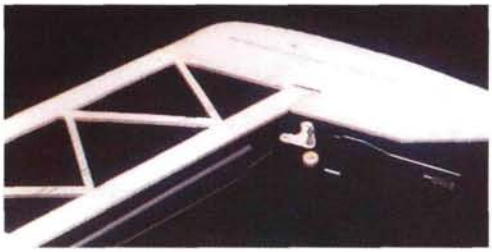


***Built-up nacelle prior to the addition of the top rear sheeting and equipment installation. Like the fuselage, the structure is simple and rugged, and it's easy to build.***



***Internal layout of the nacelle showing foam-wrapped tank (top of photo), throttle servo and rudder and elevator servos. The Spring Air retracts are just visible near the center of the photo.***

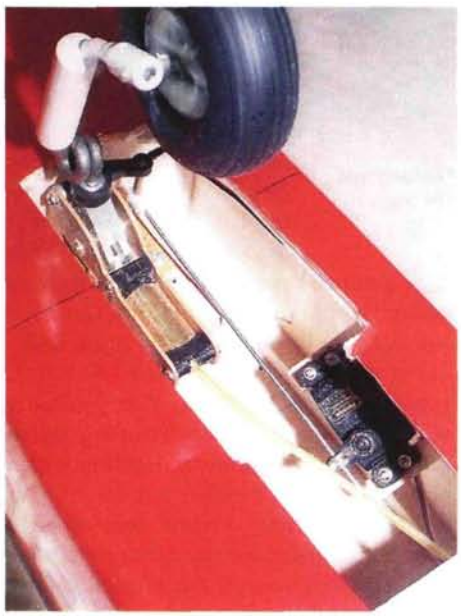
Nyrods or the solid pushrod type. The rudder linkage is straightforward; it uses a simple pushrod directly from the servo to the rudder horn on the rudder's inside



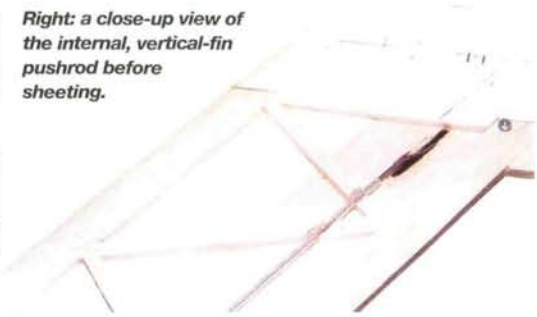
***Elevator-actuation-linkage parts. The nylon tube and vertical pushrod will be built into the fin before it is sheeted.***

face. The elevator linkage, housed in the nacelle, is equally direct but is connected to a bellcrank mounted on the outer inboard surface of the nacelles at the location shown on the plan. The other end of the bellcrank is connected to a wire that runs inside a tube in the vertical fin.

I assumed that you would want your Bronco to have retracts, so the plan doesn't show any fixed-gear installation. The three Broncos completed from this plan all use the Spring Air* units with custom struts, and they continue to perform well. They are rugged and simple and will automatically extend if allsystem air is lost. If you do wish to use fixed gear, it is a simple matter to add some grooved hardwood blocks across the nacelle—just like the installation that's typical of most of the sport models with which you are probably already familiar. The nose-gear unit—retract or fixed—is simply bolted to the 3/16-inch birch ply F3 bulkhead.



***The Spring Air retractable nose-gear installation. This view shows the strut and steering servo—a simple setup.***



***Right: a close-up view of the internal, vertical-fin pushrod before sheeting.***

***Here, the left vertical fin's inner face shows the bellcrank and pushrod, along with the exit point of the internal pushrod.***

## SIMPLE TAIL GROUP

The empennage consists of the horizontal stabilizer and elevator and a pair of vertical fin and rudder assemblies. These are built up from balsa framework and ribs that are then sheeted on both sides. The stabilizer framework incorporates four alignment dowels that ensure the proper

***The stab attachment locks have been glued to the inside face of the vertical fin; this allows the stabilizer to be bolted into place rather than glued.***

incidence when the model is assembled. If you plan to make the stabilizer removable for transportation, it would be a good idea to install aluminum bushings in the framework through which the 6-32 assembly bolts will pass. Since the vertical fins also house the tube and pushrod wire that connect the actuation bellcranks, I suggest you prepare the basic framework, sheet one side, cut carefully through the framework to install the wire/conduit and then sheet the other side. Since, for appearance, you want the pushrod to exit through the fin's inside face, mark the fin appropriately before you apply the sheeting. Don't forget to install a small, birch-ply hard-point to which you'll attach the externally mounted upper bellcrank. This system is simple, it works extremely well, and it has

*The fuselage's forward end. A balsa block has been used for the nose piece, but the vacuum-formed plastic part is also available.*

been virtually trouble-free on all three prototypes. Just remember to make all the wire-to-bellcrank connections slop-free.

All that remains of the building end of this adventure is the application of all the sheeting and planking where necessary, the fabrication and attachment of all the other parts—nose cap, rear fuselage cap, engine cowls and wingtips, etc. Unless you really love carving block balsa, consider purchasing these components in a convenient, ready-to-use form. I just happened to have these vacuum-formed parts, since I had to do the carving. If you use the plastic parts, permanently attach everything except the cowls. The fit should be very close, requiring just a touch of filler to blend with the surrounding wooden structure. Add some basic cockpit goodies such as instrument panels, glare shields and whatever other things you choose to dress things up with (nothing looks emptier than a flat cockpit floor). A final sanding and ding-filling session should have you near the point of covering. Install the engines, tanks and throttle linkage and fit the cowls. If you tilt the engines on the firewalls to approximately the 10-o'clock position, the muffler can be tucked neatly underneath the wing, close to the nacelle. Having your spinners on hand when you fit the engines on their mounts will make things much easier.

*I used two O.S. .46FX 2-strokes in the prototype. The engines have been tilted to the 10-o'clock position to provide better muffler clearance.*

### ASSEMBLY TIME!

Bolt all the airframe components together for the first time and step back. Looking at the result of your efforts in its ready-to-cover state for the first time is gonna get you goin'; if it doesn't, check your pulse! It would also be a good time to check everything else you've done along the way: wing-to-nacelle/fuselage fit, stabilizer-to-fin alignment and general surface preparation, etc., because we're closing in on the fun stuff—finishing!

If you're like many of us scale guys, long before you ever ordered the plan for this baby, you already had a paint scheme in mind. And that's the way it should be; always have your documentation on hand before you start a project. It minimizes problems later on, and more important, it gives you something to think about while you wait for the plans to arrive.

My original Big Bronco was finished in the same Navy scheme as I used on the smaller version years ago. I thought it was attractive and visible then; it seems even more so now. Flying buddies Ted Rufo and Gene Davis were the guinea-pig "plan provers" on this project, and Ted chose a Marine Desert Storm-type scheme for his Bronco (tan over light blue MonoKote* with dark green Cheveron* flat paint sprayed on for the camo). As I write this, Gene has his ready for finishing, but he is still undecided on a finish; I think a USAF FAC scheme would be great! You probably won't have a problem finding paint schemes for your Bronco; deciding which one to use might be quite a different matter! If you decide to paint, remember to save a little paint for the canopy framing. Add a pair of your favorite pilot figures, secure the canopy, and you should be ready to go!

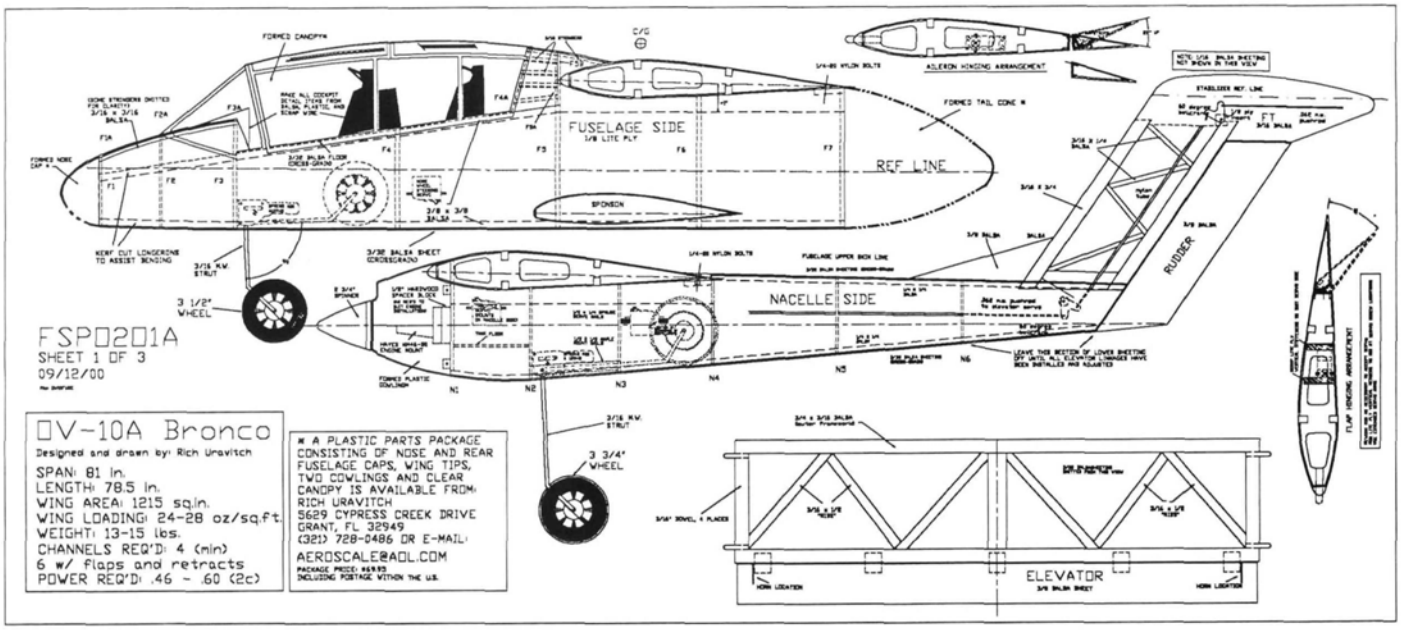
### PROPER PREFLIGHT!

When it's time to test-fly your new Bronco, do yourself a huge favor: do all your homework at home! Check the CG with the gear retracted, as there is a slight rearward shift of weight (the struts and tires) when it's retracted. Homework assignments also include running the engines, cycling the gear, checking for leaks and working the controls to make certain they follow your command. Look away from the model, move the sticks, and have someone else tell you which control is moving which way. You'd be amazed at how many test-flight crashes are caused by control throws being reversed, even after they've been checked on the ground.

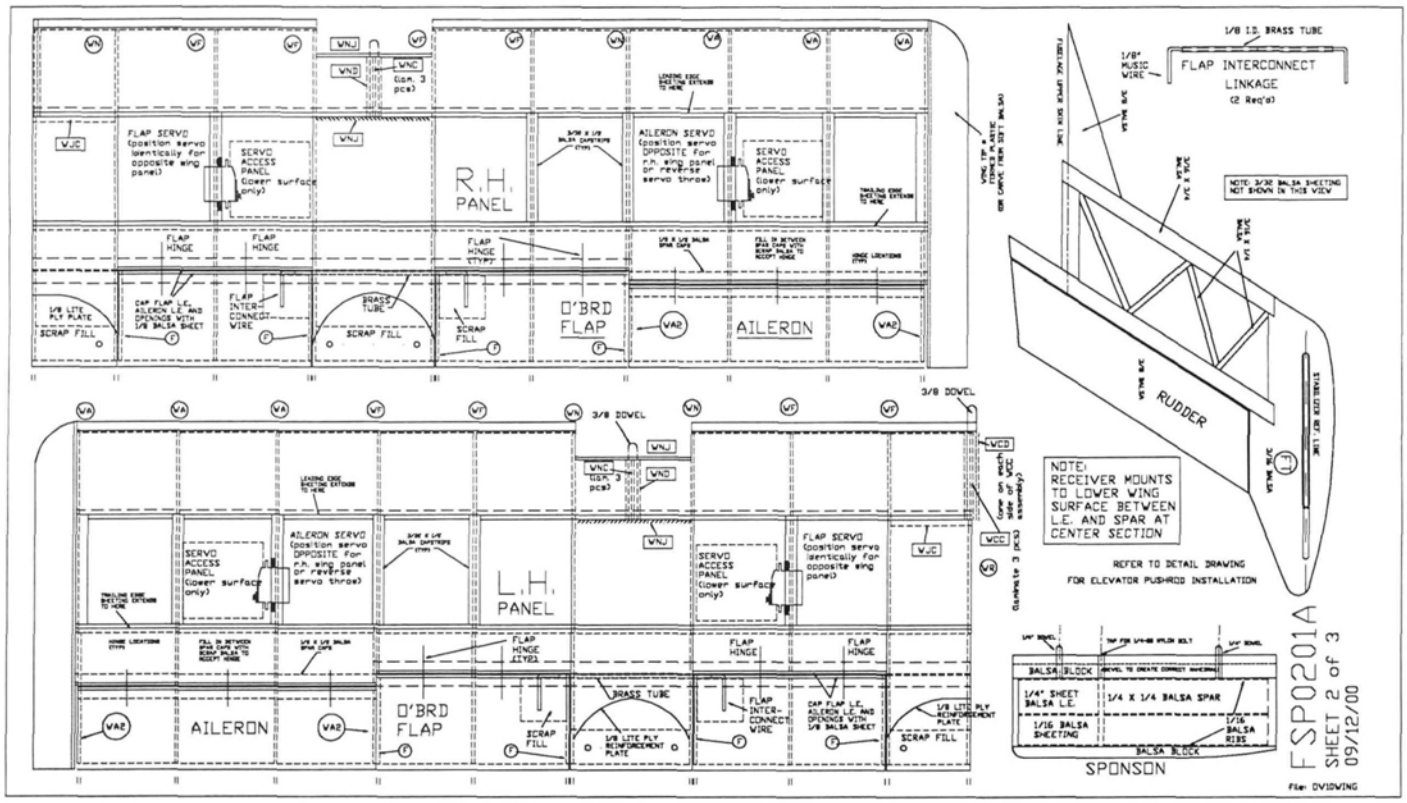
Here's a little tip about multi-engine throttle settings. It is not necessary, on any twin, to get every last rev out of the engines. If you feel it is, install larger engines. As a rule, I adjust the weaker of the two engines to a couple of hundred rpm off peak and then adjust the other one to match. It's a safe setting—one that is far less susceptible to quitting because of going to an over-lean condition as a result of fuel draw or related problems. I've reached the point at which I use a tach only to verify what I hear, and believe me, there is nothing like the sound of a twin when the engines are on song and talking to each other! Doing all this prep work has some real advantages. If any problem arises, you'll be able to remedy it in the comfort of your workshop with tools and materials readily available. The result is that when you do eventually head off to the field, you'll be able to field the many questions that always come with the appearance of an exciting new model, nonchalantly set up your model, fire up the engines and have them settle into a beautiful idle. It doesn't get much better than this!

## BRONCO PARTS

To speed your building process, I have a plastic parts set that consists of the nose and rear fuselage caps, two wingtips, a pair of cowls and a huge, clear canopy with the framing molded in. I also have available Spring Air retracts with the 3/16-inch music-wire struts bent specifically for the Bronco. The plastic parts set costs $69.95, including postage; the retract set, with all air accessories, costs $200. They may be ordered directly from me at: Rich Uravitch, 5629 Cypress Creek Dr., Grant, FL 32949; Aeroscale@aol.com.




**To order the full-size plan, turn to "RC Store" on page 200.**




The test flight of your Bronco, if it's anything like the two I've done, will almost qualify as a non-event. The tricycle gear keeps it heading where you want it on the takeoff roll, rotation is clean, and climb-out is crisp. All the flight controls are responsive but not sensitive. You'll be absolutely amazed at how effective the flaps are when they're extended for landing. The model slows down dramatically, and you can almost point the nose at a spot on the runway and fly it there with throttle. It is very aerobatic—not TOC aerobatic, but scale aerobatic. The rolls require a little pitch correction if you want to keep them axial, loops are big and round, and stall turns, eye-watering!

This Bronco has more than achieved the objectives I had for it when I started the project. It's a multi-engine, giant-scale warbird that uses sport .46 to .70 engines, off-the-shelf retracts and non-exotic building materials; it's also quick to build and flies easily. I hope you've decided to enter the RC multi-engine fraternity by building your own OV-10. It is unique, exciting and as about as non-intimidating a way to get into flying a giant-scale twin as there is. I hope you enjoy yours as much as I do mine. As always, if I can be of help, drop me a note. In the meantime, order the plan and get started! This is your year to get your multi-engine rating!

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.*

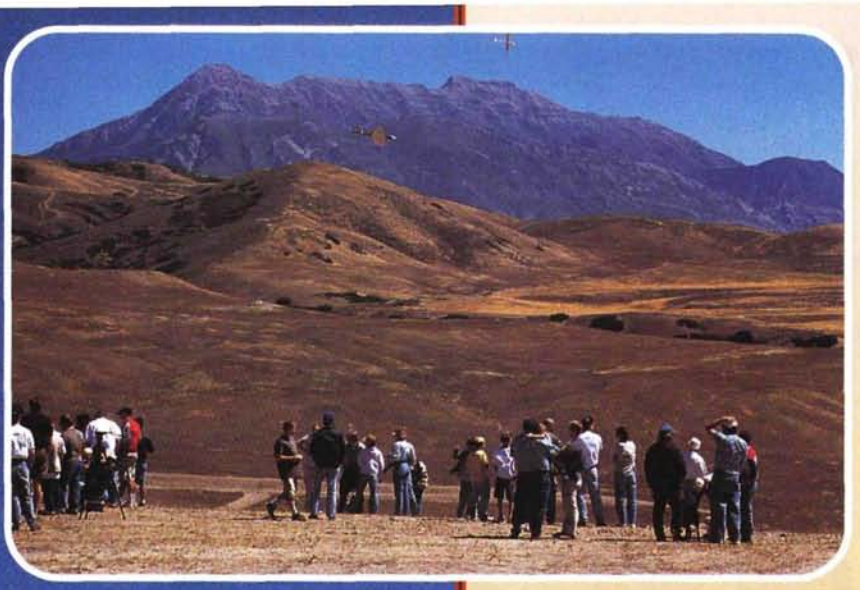
# SOAR UTA

*by Dave Garwood*

## *Spectacular scale soaring*

***Wayne Rigby watches Dave Sanders fly a Dave's Aircraft Works EPP-foam Schleicher Ka6.***

***Jack George launches Tony Matyi's Swift at Point of the Mountain. Tony flew this plane to second place in the modern scale category.***



A big Supermarine Spitfire flies by the crowd.

PHOTOS BY DAVE GARWOOD

Soar Utah 2000—a scale and power scale soaring extravaganza—was characterized by wind and camaraderie. All four days of the event were windy—at times, too much so for some planes—and we saw more old friends and met more new ones than at any slope soaring event I've attended in the last 10 years! Staged in early September by the capable Intermountain Silent Flyers club of Salt Lake City, this third-time event drew 61 pilots from 15 states and Canada, England and Germany, flying 200 sailplanes.

The four days were spent at three superb flying sites: first, the famous Point of the Mountain (POTM) club site, an ancient sandbar in prehistoric Lake Bonneville that today is a 400-foot-high ridge over which hang-gliders, parasailors and RC soaring pilots fly. Following tradition, we trekked to 8,000-foot-high Francis Peak in the Wasach Range for a day of alpine soaring at a stunning site overlooking the Great Salt Lake 5,000 feet below. Next, we were awed by a new site: Antelope Island in the big lake, reached by a 5-mile causeway. The scenery and the slope soaring were unparalleled at this site.

***Above: Steve Savoie's 120-inch-span original design Lockheed U-2. The plane carries a camera, and Steve flew it to second place in the PSS category. Below: Dave Garwood and Rich Loud launch Doug Buchanan's BAe Hawks at Point of the Mountain. Photos by Wayne Rigby.***

***Above: Ralph Roberts launches an original-design Grumman X-29 forward sweptwing (FSW) experimental jet at Point of the Mountain. Photo by Joe Chovan. Below: George Joy launches Ted Willett's ASH-26 over Point of the Mountain. Ted took first in the modern scale competition.***

Dynamic soaring (DS)—flying on the back side of a hill and gathering energy by flying across the boundary layer between moving and still air—is rapidly becoming popular, and we saw some extreme speeds generated by DS, both at Francis Peak and Antelope Island.

### ANTELOPE ISLAND

Friday was a travel day for many, but about 40 pilots came to town for the short trip to Antelope Island. The atmosphere was active with a few squall lines blowing through that produced 20mph winds and created tremendous lift as they came across the water and blew up a treeless, 200-foot-high slope. A tremendous variety of sailplanes was flown, from foamie combat warbirds to crunchy warbirds, racers and sport planes and scale 120-inch-span planes.

Paul Naton put on a great one-man airshow with his own-design Speed Runner slope racer. After watching him, Steve Savoie of Vermont commented, "If I did nothing other than see this flight, the trip was worth it." Paul and fellow videographer Dave Reese explored several spots on the back side of the hill, looking for the best DS opportunities.

Mid-afternoon featured stall-turn formations of fiberglass power slope scale (PSS) warbirds, and an informal, late afternoon foamie combat match generated plenty of laughter. We flew until 8 p.m.

### POINT OF THE MOUNTAIN

We woke Saturday to moving leaves and, by the time we got to the POTM slope, 18 to 25mph winds were blowing with blue skies and 80-degree temperatures. The wind speed increased during the

## AWARD WINNERS

**SCALE COMPETITION, MODERN**

| Place | Name | Plane |
|---|---|---|
| 1 | Ted Willett | ASH-26 |
| 2 | Tony Matyi | Swift |
| 3 | Kerry Cochrell | ASW 27 |

**SCALE COMPETITION, VINTAGE**

| | | |
|---|---|---|
| 1 | Dave Sanders | Perl Penetrator |
| 2 | Mike Lance | Schleicher Ka6 |
| 3 | Tom Hoopes | Northrop Primary Glider |

**SCALE COMPETITION, PSS**

| | | |
|---|---|---|
| 1 | Dieter Mahlein | Northrop F-5 |
| 2 | Steve Savoie | Lockheed U-2 |
| 3 | Brian Laird | McDonnell-Douglas F-15 |

**PEOPLE'S CHOICE, MODERN**

| | | |
|---|---|---|
| 1 | Mike Lance | DG-600 |
| 2 | Mike Lance | Salto |
| 3 | Al Wedworth | ASW 27 |

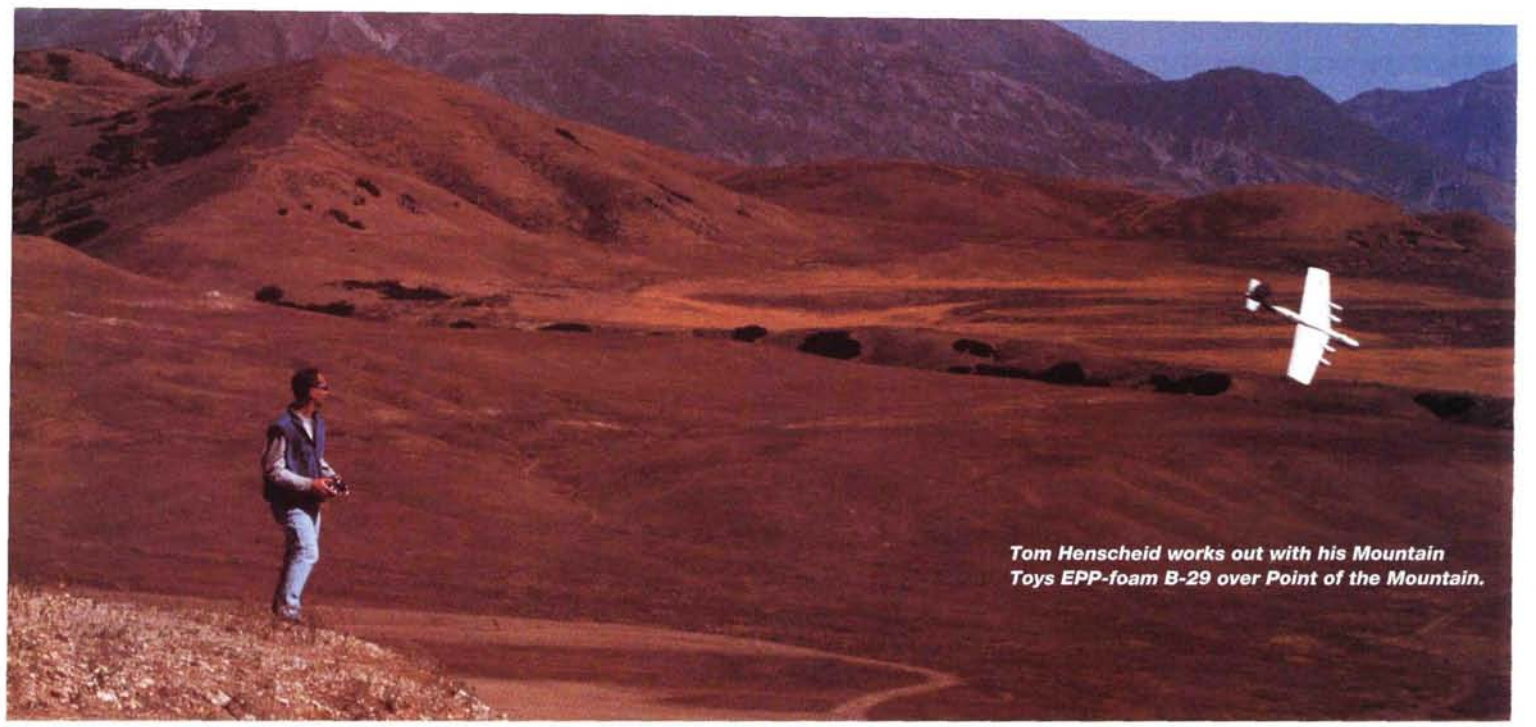
**PEOPLE'S CHOICE, VINTAGE**

| | | |
|---|---|---|
| 1 | Dave Sanders | Perl Penetrator |
| 2 | Tom Hoopes | Northrop Primary Glider |
| 3 | Steve Savoie | Lockheed U-2 |

**PEOPLE'S CHOICE, PSS**

| | | |
|---|---|---|
| 1 | Brian Laird | McDonnell-Douglas F-15 |
| 2 | Steve Savoie | Lockheed U-2 |
| 3 | Mike Lance | Voodoo Reno Racer |

***Durable Aircraft Models P-51 Mustang built and flown by Jim Misunas over Point of the Mountain slope soaring site. Photo by Joe Chovan.***



*Tom Henscheid works out with his Mountain Toys EPP-foam B-29 over Point of the Mountain.*

day, eventually reaching 35mph, and winds stayed south—straight in to the main slope—to provide memorable slope-flying conditions.

A low-key competition included a series of compulsory and elective maneuvers followed by a static judging with attention to craftsmanship, overall appearance and uniqueness. The smaller, faster planes flew their competition flights on Saturday, but several pilots kept their larger planes under wraps, hoping for slightly less wind on the following day.

Some memorable flights included the ISR* Toucanos and Vortech Models* FW-190s, five Brian Laird* Hellcats flown in formation, a pair of matched Doug Buchanan BAe Hawks and Steve Savoie's large U-2 spyplane with a camera onboard.

Most memorable was Doug Barry's 120-inch-span EPP-foam Ka6 losing its vertical fin in a foamie furball, and then watching Doug execute a perfect downwind emergency landing and rolling out on the wheel.

At the Saturday evening banquet, 90 people feasted, voted for the Pilots' Choice awards and picked up fine prizes at the immense, end-of-evening raffle that supported the event and improvements to the club field. Many thanks to the generous individuals and companies who donated items to the raffle.

### POTM—SUNDAY

Sunday found us back at POTM with only slightly lighter winds (10 to 15mph) and cooler temperatures (70 degrees). The remaining modern and vintage scale models were flown and judged. For most of the day, the entire slope was active with PSS formation flying on the east end, slope rockets on the west end, big scale ships flying up and out and foamies in the middle.

Art Markewicz flew his 10-foot-span foam flying wing, "The Mother Ship," which was vigorously attacked by a swarm of foamies that unsuccessfully attempted to down him. Other memorable planes were Ted Willett's Multiplex USA* 4.5-meter-span ASH-26, Dave Sanders' scratch-built PG-130 and Tom Hoopes's scratch-built Northrop Primary Glider. A couple of great-looking new EPP-foam planes were Mike Lance's Voodoo Reno Racer and Tom Henscheid's Mountain Toys* B-29 Superfortress.

**Soar Utah 2000 Sponsors**

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Airtronics
Al the Bag Lady
Bowman's Hobbies
Cavazos Sailplane Design
Chuck Anderson
Compufoil
Dave's Aircraft Works
Del Brengman
ES Models
George Voss
Hobby Club
K&A Models
MAD Aircraft Design
MM Glider Tech
Mountain Toys
MRS Hobby
Patton Aircraft
Radio Carbon Art
ShredAir
Peak Electronics
S&E Modeler
Slope Scale
SL Models
SR Hobbies
Stan's Fiber Tech
Thermal-Gromit Works
Traplet Publications
Trick R/C
Van Gundy Wing Bags
Vision Hobby
Wright Engineering

The wind stayed with us all day, and we flew until we were exhausted.

### FRANCIS PEAK

At 9:30 Monday morning—Labor Day—we left the hotel and headed north for Francis Peak. This amazing slope flying site is accessible by car via a twisting, gravelly mountain road. It's a little scary the first time, but of course, "Real men don't need guardrails."

Near the top, above the tree line, the views to the east and west are breathtaking. We usually flew west into the prevailing daytime winds, but this time, we were thrilled to watch Dave Reese fly the east side in a demonstration of dynamic soaring that most observers won't soon forget. Dave started with a Pat Bowman* Sonic flying wing to explore the air on the back side. He launched into slope lift on the west side, then crossed over the saddleback to the east, looped in and out of moving air and into still air, and built up some pretty hefty airspeeds.

After some practice, Dave brought out his ShredAir* Brisk, a fiberglass-and-foam F3B-type plane, and repeated the pattern. His loops got faster and faster, straining the airframe. Sometimes, Dave traded speed for altitude and exited a loop vertical, shooting up for 5 or 6 seconds and climbing 400 feet above the DS site.

The speeds achieved were astonishing; the sound, unforgettable. Reese's license-plate holder reads, "DS Will Change Your Life," and he's right about that.

In the "big sky, big lift" conditions at Francis Peak, almost anything will fly, but on this day conditions favored heavier planes that could penetrate out into steadier lift. The air was more turbulent than in previous years, and some pilots noticed the lift suddenly disappear briefly. Nevertheless, groups of five to 10 pilots flew until late afternoon.

This weekend was memorable for the quality of the flying, the variety of planes and the warm hospitality of the sponsoring club. Soar Utah is not an annual event but rather is held every two or three years. For more photos of Soar Utah 2000 and information on the next Soar Utah, see the IMSF club's website at www.silentflyer.org.

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* ✈

*Lanier RC*

# STAUDACHER S600

*by Jim Onorato*

IMAA- and IMAC-legal, scale aerobatic airplane kits and ARFs are all the fashion these days—from Lasers to Extras to Giles to CAPs and now Staudachers. Bubba Spivey of Lanier RC* has come out with two versions of the Staudacher: the S300 and the S600. Both are 31.5 percent kits and differ only in their canopies and forward hatches; the S300 is a single-seater, and the S600 is a two-seater. I chose the Staudacher S600, but to see how the Staudacher looks in both configurations, I also built an S300 canopy and forward hatch.

## SPECIFICATIONS

**Model:** Staudacher S600

**Manufacturer:** Lanier RC Inc.

**Type:** unlimited aerobatic

**Wingspan:** 96 in.

**Wing area:** 1,624 sq. in.

**Weight:** 28 lb.

**Wing loading:** 39.7 oz./sq. ft.

**Length:** 83.5 in.

**Engine req'd:** 3.2 to 5.0 2-stroke

**Engine used:** Fox 4.2 gasoline

**Prop used:** Mejlik 22x12 carbon fiber

**Radio req'd:** 4-channel

**Radio used:** Futaba 7-channel with 9 servos (including smoke and remote kill switch)

**Street price:** $280

**Features:** laser- and router-cut balsa and lite-ply, built-up fuselage and turtle deck; built-up tail feathers; symmetrical-airfoil plug-in wings with partially sheeted foam-cores and an aluminum spar; vacuum-formed canopy; ABS plastic cowl and wheel pants; hefty preformed aluminum landing gear; AutoCAD-generated plan.

**Comments:** its high-quality materials make this kit a pleasure to build. The assembly is easy, and the finished product looks great. The plane's aerobatic capabilities are just what you'd expect—spectacular! Slow-speed handling is pleasantly stable.

**Hits**

- Excellent flight performance and low-speed stability.
- Easy-to-follow plans and instructions.
- High-quality foam-cores and laser-cut plywood parts.
- Looks great.

**Misses**

- Plan is drawn in three different scales.

### THE KIT

The Staudacher continues Lanier's BFPP (balsa, foam, ply and plastic) concept that has been successful in their other large-scale kits. Lanier has made several recent improvements, and the Staudacher benefits from these refinements. Top-grade lite-ply is used instead of lauan, and many of the plywood and balsa parts are laser- or router-cut. The only ABS plastic parts are the cowl and wheel pants, and Lanier has optional fiberglass replacements. The Staudacher has symmetrical, foam-core wings, built-up tail feathers and a lite-ply, hardwood and balsa fuselage. This kit doesn't contain hardware, but it lists everything needed. The plan's two rolled sheets are AutoCAD-generated and show plenty of detail. Surprisingly, the wing is drawn to ¾ scale, the fuselage to ½ scale, and the tail group is drawn full size. Fortunately, this wasn't much of a problem since only the tail group is built over the plan. The 19-page instruction booklet contains step-by-step written instructions and plenty of photos.

I used Great Planes* 6- and 30-minute Pro Epoxy on the plywood parts and thin and medium Pro CA on the balsa and plastic parts. I attached the wing sheeting to the foam-cores with Zap* Finishing Resin. I used Robart* Super Hinge points on all the control surfaces, and Sullivan* fuel tank, wheels, tail wires and pushrods.

### BUILDING THE WING

The wing is tapered and has a symmetrical airfoil. The wing-panel foam-cores are precut; be careful with them, because the feathered trailing edges (TEs) are delicate. When viewed from the leading edge (LE), each core's top surface is flat, and the bottom is tapered. I marked the top of each wing panel so I wouldn't be confused later. I used white glue to fix the fiber wing-spar tubes in the foam-cores, and I used epoxy on the eight hardwood spars.

The wing panels must be partially sheeted as follows: from the forward spar to the LE, from the rear spar to the TE and 10 inches of the center section at the root. I trued all the sheets and edge-glued them with white glue. I attached the skins to the foam-cores with a very thin coat of Zap Finishing Resin. While the epoxy was curing, I sandwiched the partially sheeted core between its foam packing pieces on my pool table, covered the core with a piece of wood, added six 5-pound bags of lead shot and let the epoxy cure overnight. The instructions tell you to do both sides of a panel at the same time, but I found this a little tricky, so I did them one at a time. I used balsa sticks to simulate capstripping.

Next, I attached the LEs and endcaps and cut out the ailerons and servo wells. I placed the wing panels in their foam packing pieces to keep them square as I cut out the ailerons on my band saw. I covered the exposed edges of the wing and aileron with balsa. I used five large Robart hinge points, an FMA* 355M servo (103 oz.-in. torque) and a Rocket City* swivel link with a 4-40 pushrod for each aileron.


***The 2-place canopy is the only thing that differentiates the S600 from the S300. I acquired one of each for this project; the fuselage uses the same mounting surface for both, so switching them is easy.***

### TAIL GROUP

I built the fin and rudder over the plan with ⅜-inch balsa stripwood and some 3/16-inch laser-cut balsa parts that I first laminated. The fin post is a piece of ⅛-inch lite-ply. The stab and elevator halves are built in the same way as the fin and rudder are, but the elevator halves aren't joined because each is controlled by its own servo. I inserted slices of ⅜-inch dowel into the fin and stab to reinforce the points to which the tail wires would be attached. I used the cable from two Sullivan tail-wire kits that come with both cable and Kevlar. (Don't fly the Staudacher without tail wires!) I used three medium Robart hinge points per control surface for the rudder and elevator hinges. In the fuselage's rear I mounted two Futaba* servos for the rudder and two for the elevator.

### FUSELAGE

Before I started to work on the fuselage, I removed the excess wood from the sides, doublers and top former and sanded the edges to remove tabs, notches and fuzz.

## FLIGHT PERFORMANCE

For the first flight, I set up the transmitter so that high rate produced the recommended control-surface throws and low rate produced 70 percent of those values. I used low rate for the initial takeoff.

**• TAKEOFF AND LANDING**

On takeoff, the tail lifted almost immediately, and the Staudacher tracked straight ahead without any right rudder. I let it roll about 75 feet then applied just a touch of up-elevator. The Staudacher lifted smoothly into the air with the wings perfectly level. Just two clicks of down-elevator trim produced straight and level hands-off flight.

With the Fox at idle, the Staudacher settled in for beautiful wheel landings and smooth rollouts. Since I had the luxury of a long, grassy landing strip, I approached the end of the strip at moderate speed and just let the speed bleed off gradually until touchdown. The Staudacher remained stable through it all.

**• LOW-SPEED PERFORMANCE**

The Staudacher is smooth and predictable at slow speed. I took it to a safe altitude and reduced the throttle as I applied more and more up-elevator. The stall was gentle and straight ahead. The plane can be flown at a very slow speed without losing stability and can execute all but vertical maneuvers at partial throttle.

**• HIGH-SPEED PERFORMANCE**

The Staudacher isn't particularly fast with the Fox 4.2, but it flies at a very comfortable scale speed and tracks extremely well at full throttle. In fact, I found it to be a smooth and stable flyer at all speeds.

**• AEROBATICS**

This is what the Staudacher is all about. It's a proven aerobatic airplane, and it's capable of every maneuver imaginable. In fact, pilot skill was the limiting factor in testing aerobatic performance. Inside and outside snap rolls are beautiful—just fast enough to be appreciated. Axial rolls are fast and truly axial. Sustained knife-edge and outside 360-degree turns are no problem for the Staudacher. Spin recovery is within ¼ spin when the controls are released. Only a slight amount of down-elevator is required to maintain level, inverted flight.

While the Fox 4.2 isn't powerful enough to give unlimited vertical performance, it has sufficient power to haul the Staudacher straight up for about 200 feet and has no trouble with maneuvers.

With the smoke system puffing away through every maneuver, I really had a ball with this plane!

# Astro Flight News

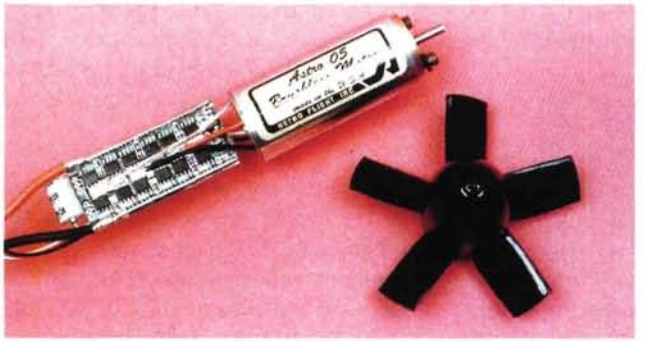
**Astro Flight Inc. Introduces five new and exciting products for the electric flyer: The new Mighty Micro 010 Brushless Motor for park flyers, a new Ducted Fan Brushless 05 Motor for the Kyosho T-33, FAI-035 and FAI-05 Planetary Motors for Sailplanes and two new surface mount digital speed controls.**

### The Mighty Micro is here!

Our new Mighty Micro Brushless 010 Motor #801 has arrived. The motor is one inch in diameter and one inch long and weighs only 35 grams with sensorless control. It spins an APC 6x2.8 prop at 9800 RPM while drawing only 2.5 amps from a six cell 350 mahr Nicad pack. Now you can fly for 5 minutes on Nicads, 10 minutes on Hydrides and one hour on lithium cells. The tiny On-Off Brushless control has Brakes and BEC. This system will work with 5 to 8 cell batteries. Perfect for models up to 10 oz.

### New Ducted Fan 05 Motor!

Our new 4 turn Brushless 05 Ducted Fan Motor #805F with 12 FET controller is specially designed to add Afterburner performance to the Kyosho T-33 and WE-Mo-Tek 480 ducted fan units. Run the T-33 fan on 8 or 9 Nicads or 10 Sanyo 3000 mahr Hydrides. The motor draws only 19 amps for 10 minute flights on Hydrides.

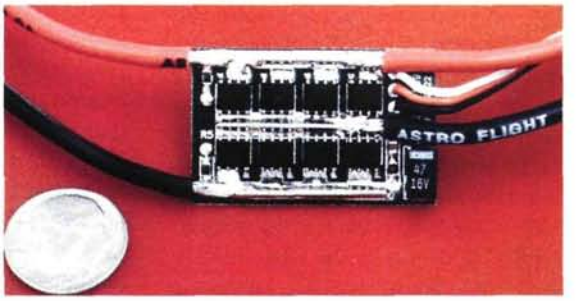


### FAI-035 with Planetary Gearbox

Our new 4.4:1 planetary gear box is now available for all Astro Cobalt 035, 05 and 15 motors. The FAI-035 with planetary gear box is perfect for 7 cell competition sailplanes. The FAI-05 with planetary gear box, shown here, is perfect for 10 cell sailplanes.

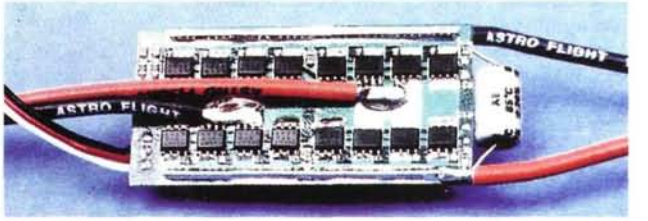

### New Astro 215D Airplane Control

The new Astro 215D Speed control uses new surface mount technology for minimum size and maximum performance. The tiny 215D weighs only 8 grams and has Brakes and BEC. It handles up to 30 amps and 10 cells. Perfect for Astro Cobalt 035, 05 and 15 motors.




### New 208D Reversing Control

The new 208D Reversing Control is designed for scale boats. It's 16 FET H-Bridge circuit gives you full power forward and reverse. The 208D weighs 1 oz and can handle 25 amps at 6 to 12 volts. It has a 2 amp BEC and a electronic current limit of 28 amps, so no fuses are needed. It was designed for tug boats and works great with 150 pound robots and electric powered blimps.



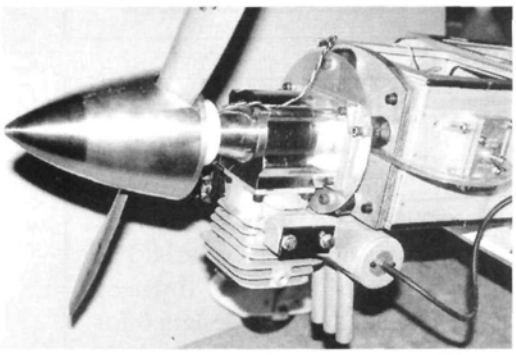

**Astro Flight Inc.** 13311 Beach Ave. Marina Del Rey, CA 90292
Phone (310) 821-6242 Fax (310) 822-6637 Web Site http://www.astroflight.com

Then I followed the instructions to assemble the fuselage.

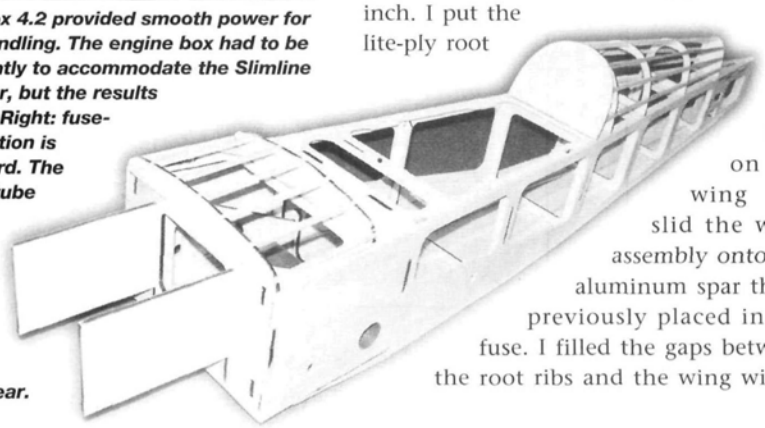
When it came time to sheet the turtle deck, I dampened the balsa sheeting with a mixture of ammonia and water so that it would bend around the formers without cracking. I particularly like the carbon-fiber tube; it's permanently fixed in the fuse and slides over the aluminum wing spar. This prevents the wing spars from wearing away at the holes in the fuse sides and causing the wing panels to loosen.

The removable forward hatch and canopy frame can be built according to the plan. Be sure to cover the fuselage top former with wax paper before you begin, or you won't be able to remove the hatch and canopy easily. Since I was modeling both the S600 and the S300, I built two canopy frames and two forward hatches. The S600 has a long canopy and a short forward hatch, and the S300 has just the opposite. Since the combined length of the two pieces is the same for both versions, they are interchangeable. The same fuselage top former is used for both the S600 and the S300, so it incorporates enough slots to accommodate either version.

When sheeting the forward hatch, I again used ammonia and water to prevent it from cracking. Next came the canopy frame with its balsa stringers. I cut the clear plastic canopy to fit the frame and set it aside until the interior was finished. The undersides of the hatch and canopy frame have lite-ply tabs that fit into slots in the fuselage top former. The tabs are attached to the fuselage with 6-32 socket-head bolts that go through its side into blind nuts in the tabs. In addition to the four provided, I used two more bolts on the long S600 canopy to make sure the middle was firmly attached.



***Above: the Fox 4.2 provided smooth power for consistent handling. The engine box had to be modified slightly to accommodate the Slimline smoke muffler, but the results looked great. Right: fuselage construction is straightforward. The carbon-fiber tube in the fuse serves as a sleeve for the aluminum wing spar and protects the wood from wear.***



### LANDING GEAR AND WHEEL PANTS

The landing gear is preformed, heavy-duty aluminum and is attached to the fuse with three bolts. I used 4-inch Sullivan wheels on 3/16-inch axles. The kit's ABS plastic wheel pants come in two pieces that must be CA'd together and reinforced on the inside with fiberglass tape. They are designed to be attached to the landing gear with 6-32 socket-head bolts. I took the easy way out, however, and attached Lanier's optional fiberglass wheel pants with Sullivan wheel-pant mounts. This allows the pants to rotate during hard landings, thereby reducing the possibility of damage.

### COWL

Glue the two pieces of the ABS plastic cowl to the 1/4-inch plywood cowl ring. A lite-ply spinner ring and a bottom former increase stiffness. The cowl ring is attached to the fuselage with four socket-head bolts through tabs on the cowl ring into retainers glued to the firewall. I drilled four small holes in the cowl's sides to access the recessed bolts. I really like this method because the bolts aren't exposed, and they don't touch the cowl itself, so vibration cracks can't form around the mounting bolts. Lanier suggests that you fiberglass the inside with 2-ounce cloth to make the cowl more durable. Although the ABS cowl looked substantial enough, as in the case of the wheel pants, I took the easy way out and used Lanier's optional fiberglass cowl.

### FINAL ASSEMBLY

To finish off the fuselage's top rear, I carved the provided balsa blocks to shape, using the dummy fin and 3/8-inch balsa block to simulate the stab and fin while carving. The procedure described in the instructions gives excellent results and makes this job a snap.

To finish the wing, I sanded the sheeting and spars flush with the wing panels and cut the fiber tubes so that they protruded 1/8 inch. I put the lite-ply root ribs on the wing and slid the wing assembly onto the aluminum spar that I previously placed in the fuse. I filled the gaps between the root ribs and the wing with a thick paste of microballoons and epoxy. When the epoxy had cured, I sanded the root ribs flush with the wing sheeting. Using a gauge to ensure that they were parallel to the wing spars—and not at right angles to the root—I installed two antirotation dowels in each panel.

***The foam-core wing panels are precut, and carbon-fiber tubes protect them from the aluminum spar. You need to partially sheet and sand the wing panels before you cover them.***

Next, I set the wing incidence. With the stab in place and the aluminum wing spar in the fuse, I blocked up the fuse so that the stab was at zero incidence. I slid one wing panel onto the spar so that the antirotation dowels were in the holes in the fuse. I used a Robart wing incidence indicator to set the incidence at zero, then I slid two W7s over the dowels and epoxied them to the inside of the fuse. I repeated this procedure with the other wing.

### ENGINE

Lanier recommends a 3.2 to 5.0 2-stroke engine for the Staudacher S600. I used a Fox* 4.2 gasoline engine. I used 30-minute epoxy on the engine box and fuel proofed it with Hobby Poxy* paint. I had to modify the engine box to accommodate the giant-scale Slimline* smoke muffler, but it was well worth the effort.

### FINISHING

I finished the Staudacher with orange and white Ultracote* and used orange Ultrapaint on the upper portion of the cowl. I used 21st Century* white paint for the lower half of the cowl and the wheel pants. I used automotive vinyl striping tape for the black stripes. I painted the inside of the cockpit with flat black acrylic paint and installed two highly detailed, Small Aircraft Components (SAC)* instrument panels and two Hangar 9* pilot figures in the S600; the S300 needed only one of each. Final touches included a Mejlik* 22x12 carbon-fiber prop and a 3½-inch Tru-Turn* aluminum spinner.

### CONCLUSION

If you want a big airplane without the big price tag that usually accompanies it, then the Lanier RC Staudacher S600 is one to consider. It's an easy-to-build kit that looks great, is very aerobatic and has good low-speed stability. I thoroughly enjoyed building and flying this airplane and highly recommend it for advanced fliers.

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* ✈

# GREAT PLANES SlowPoke SPORT 40

*by Robert Van Tassel*

As soon as I opened the box containing the Great Planes* SlowPoke Sport 40, I knew it would be a pleasure to build. My most recent projects have been ARFs, and though they were quick and easy to get in the air, I wanted the satisfaction of seeing something I built take shape and come to life. The SlowPoke Sport 40 was the perfect choice; it provided a true building experience and went together very smoothly.





*This 1/6-scale bust is a perfect fit. I printed the rabbit and turtle decals on a desktop computer using Micro-Mark decal paper. Sash cord around the cockpit simulates padding, and a strip of anti-slip stair tread on the wing adds that final touch.*

## SPECIFICATIONS

**Model:** SlowPoke Sport 40

**Type:** Sport

**Manufacturer:** Great Planes

**Wingspan:** 64 in.

**Length:** 49 in.

**Weight:** 6 lb.

**Engine req'd:** .32 to .46 2-stroke or .40 to .52 4-stroke

**Engine used:** O.S. 52 4-stroke

**Radio req'd:** 4-channel with 5 servos

**Radio used:** Futaba® T6XA

**Price:** $69.99

**Features:** CAD-engineered plan; simple interlocking construction; large wing area and light wing loading; ailerons; large radio compartment for easy gear installation; detailed, photoillustrated instruction manual.

**Comments:** this plane reminds me of the homebuilts of the 1930s. Great Planes has modified its popular original SlowPoke with the larger Sport 40 version, which incorporates ailerons. It is about the size of a .60 but flies well on a .52 4-stroke. It is a great, relaxing Sunday flyer. It is also a good way to experience the joy of a well-thought-out, fun-to-build plane that you can have in the air in a very short time.

**Hits**

- Can be assembled quickly.
- Excellent materials and die-cutting.
- Good flight performance.
- Detailed manual and plan.

**Misses**

- Leading-edge material isn't preshaped.

## SLOWPOKE

### THE KIT

The SlowPoke comes with a detailed, 28-page construction manual with clear photos of each step, well-written text and even a small copy of the plan in the center section. It contains line drawings of the top and side of the plane to work out your color scheme, and the side of the box pictures a few color options. There are also metric conversion and common abbreviations tables. The "Expert Building Tips" are a nice feature; they give valuable information at various stages of construction. The rolled CAD plan is detailed and has a ruler printed along one edge and a phone number to call if you encounter problems.

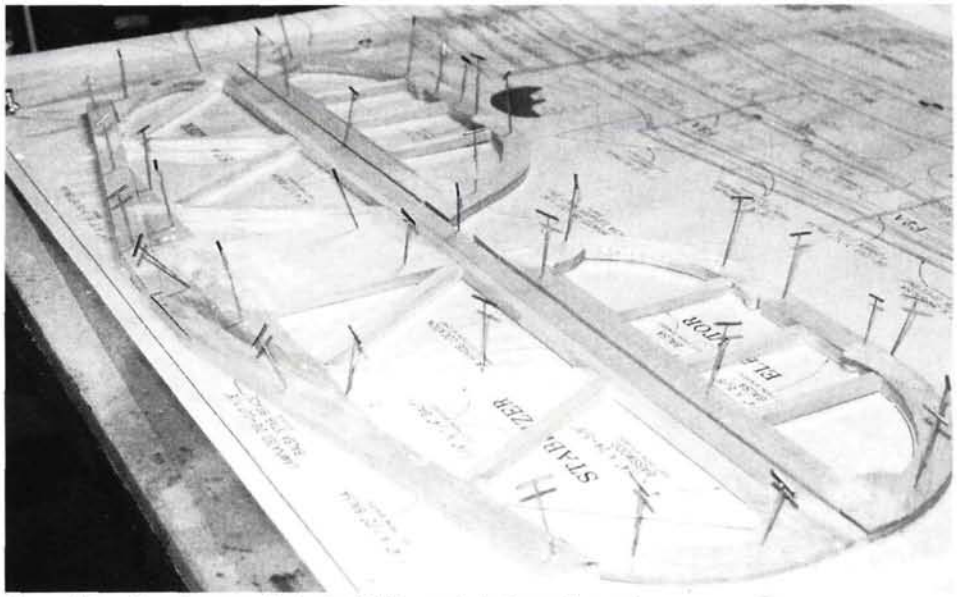
### CONSTRUCTION

The overall quality of the kit—particularly of the wood—is excellent. Pay attention to the wood sizes called for during construction; you do not have enough to waste. I used Great Planes thin, medium and thick CA for most of the building. I used aliphatic wood glue for sheeted areas to ease sanding. I also used 6- and 30-minute epoxy.

• **Tail feathers.** I laminated eight pieces of ⅛-inch die-cut balsa to form the rudder's curved trailing edge (TE). I added the leading edge (LE) and a few cross-braces to complete it.

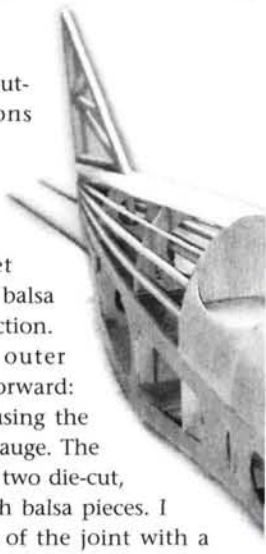
Build the fin, elevator and stab over the plan using the supplied balsa; use laminated balsa on all the curved areas. Join the elevator halves using the supplied joiner wire.

I flat-sanded most of the parts and sanded the LEs round. I cut the hinge slots using my Great Planes hinge-slotting tool; what a great labor saver!



***Assembling the wing panels is straightforward, but sanding and planing the LE took considerable work.***

• **Wings.** The wings are built in three sections over the plan, starting with the center section. A wing-plug doubler holds the wings on the fuselage from the center section's LE, and two nylon bolts hold them at the TE. This provides plenty of support and goes together quickly and cleanly at the field. The center section is built around the wing-plug doubler and the center section rib, and it's sheeted on the bottom with an ⅛-inch skin. Be careful building this section; accurate alignment is vital if you're to join the outboard wing sections properly. Secure the polyhedral braces with 30-minute epoxy, then sheet the top in ⅛-inch balsa to complete this section.



Building the outer panels is straightforward: add the root ribs using the supplied dihedral gauge. The wingtips consist of two die-cut, butt-joined, 3/32-inch balsa pieces. I reinforced the top of the joint with a

## FLIGHT PERFORMANCE

I first flew the SlowPoke with a 2-stroke .40, and its flight performance was marginal. I then switched to an O.S.* 52 4-stroke, which proved to be perfect.

### • TAKEOFF AND LANDING

After performing the routine preflight checks, I faced the SlowPoke into a 10mph wind and slowly applied power. The tail comes up in about 30 feet at a little more than ½ throttle. With very little right rudder and a little up-elevator, the SlowPoke comes off the ground in about 60 feet.

Landing is a piece of cake; just line up with the runway and reduce the power on final, and the SlowPoke settles in for a 3-point landing. As unlikely as it seems, these 3-point landings are easily repeatable; I did identical ones after four consecutive flights!

### • LOW-SPEED PERFORMANCE

This is where this plane excels. I took it up high, faced it into the breeze and reduced power while feeding in up-elevator. The plane slowed to a crawl and continued to fly. I applied more up-elevator and reduced power back to an idle, and it still continued to fly. This plane simply will not stall.

### • HIGH-SPEED PERFORMANCE

This is not a high-speed plane; one look at the chord and design will tell you that. But with a suitable powerplant such as the O.S. 52, the SlowPoke produces respectable speed—certainly more than its name suggests!

### • AEROBATICS

Although the SlowPoke isn't a pattern plane, it will do mild aerobatics when set at the high aileron rate. Loops are smooth and require no additional power. On high elevator rate, the SlowPoke loops in about 20 feet and at a speed that an intermediate flier can appreciate. Rolls require aileron/elevator coordination. I tried to spin a number of times and succeeded only in doing a slow spiral, but hammerheads are another story: with that large rudder, you can go straight up, kick over the rudder and take the same path down. Inverted flying requires a lot of down-elevator, but it can be done. The nice thing about this plane is that everything happens slowly, so you have plenty of time to get yourself out of trouble.

couple of scrap pieces of ⅛-inch strip balsa. The ailerons are made as part of the wing. I installed two pieces of string to act as drawstrings for easy servo installation.

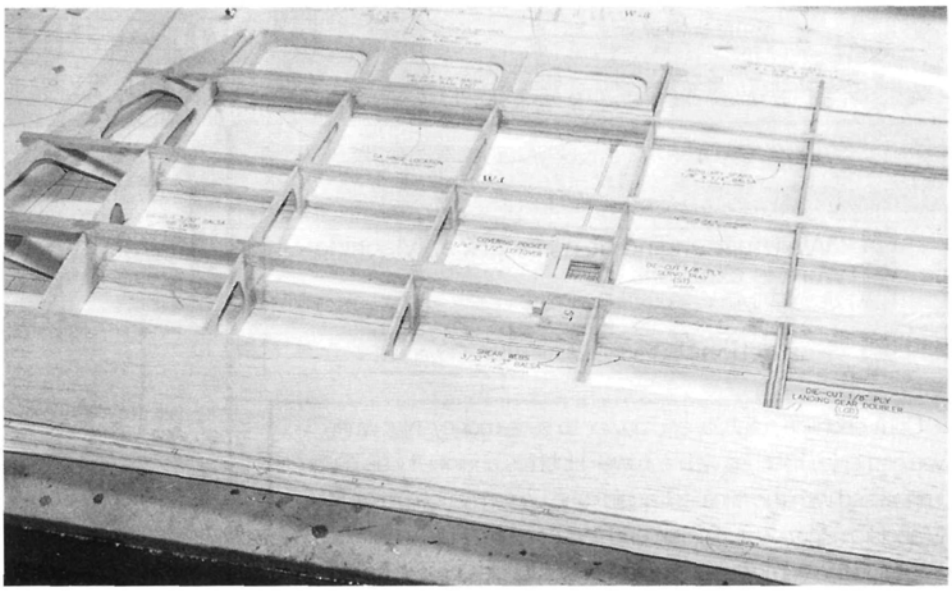
I inserted the wing joiners (the ones that I had previously installed in the center section) into the wingtips and, using the supplied wingtip supports, I joined the tips to the center section using 30-minute epoxy. I sanded the wing LE to shape; this required quite a bit of planing and sanding. It would have saved a lot of work had Great Planes provided shaped LE material.

### THE FUSELAGE

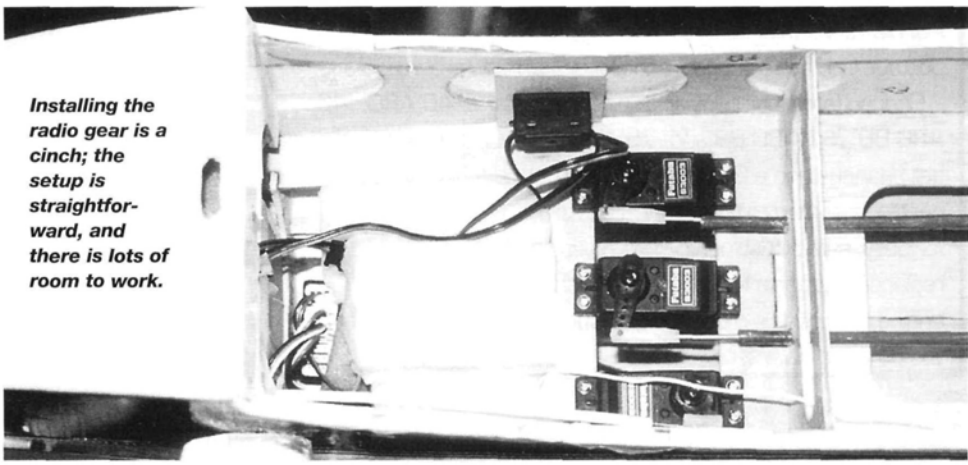
The fuselage is built upside-down on the plan. Be sure to follow the instructions carefully, as the engine is mounted on the forward fuselage plate, and you can easily end up with a reversed thrust line. Fabricated die-cut balsa and plywood form the fuselage sides. Join them to the fuselage plate upside-down and then add the formers. Next, glue the rear ends of the fuselage sides together, clamp them, and add the planking. Now turn the fuselage right side up and sheet the bottom front of the engine compartment. I coated the inside of the forward fuselage bays with thinned epoxy. I also cut a small slot in the lower sheeting, just in front of the firewall, to allow any fuel to drain out. Next, I added the upper formers and cockpit, and the fin, turtle-deck stringers and forward sheeting completed the fuselage.

### FINISHING

After fitting all the parts together, I laterally balanced the plane and finished sanding it. I used two rolls of yellow and one roll of blue Coverite. Just for the fun of it, I used some Micro-Mark decal paper in my computer printer to generate a few rabbit decals, which I applied to the side of the cockpit to represent "kills." I also generated a small turtle decal for the cockpit's left side. I sprayed the decals with Micro-Mark Last Step to protect them from fuel.

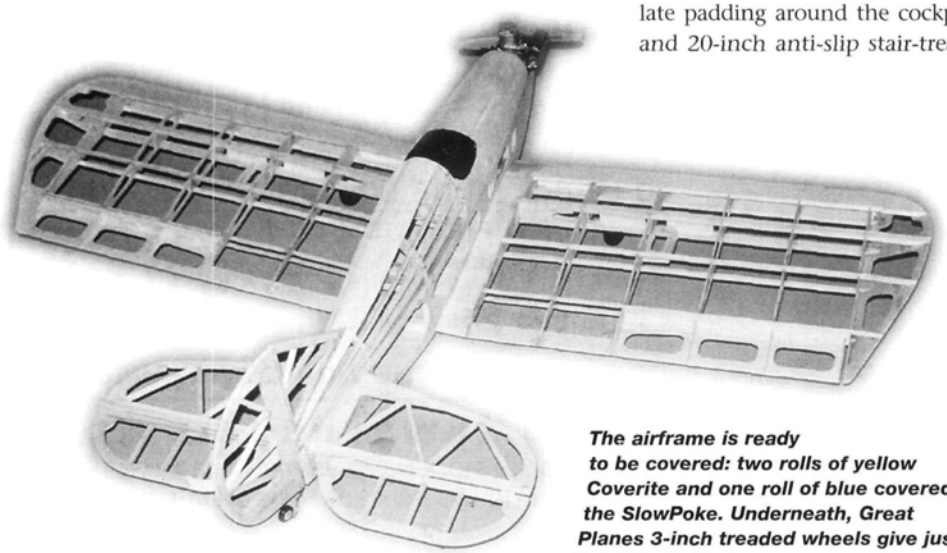


***The elevator and horizontal stabilizer are built over the plan; laminated balsa is used for the curved pieces. A Great Planes hinge slotter made hinging the control surfaces easy.***



***Installing the radio gear is a cinch; the setup is straightforward, and there is lots of room to work.***

The plan suggests a ¼-scale pilot, but I used a ⅙-scale pilot figure instead and painted him with flat acrylic paint oversprayed with flat polyurethane. The rudder is trimmed in a black and yellow checkerboard pattern. I made a quick trip to the local hardware store for sash cord to simulate padding around the cockpit and 20-inch anti-slip stair-tread material, which I applied to the upper side of the wings to allow my pilot easy access to the cockpit. I used 3-inch treaded wheels from Great Planes and a 10-ounce fuel tank. I cut a slit in the covering, used medium CA to attach the windshield and trimmed it with black. The radio installation is straightforward, and there is plenty of room to work. To my surprise, though, it took 5 ounces of lead under the engine to balance the plane.



***The airframe is ready to be covered: two rolls of yellow Coverite and one roll of blue covered the SlowPoke. Underneath, Great Planes 3-inch treaded wheels give just the right look.***

### CONCLUSION

Great Planes has put a lot of effort into the design and production of this kit, and it shows. I like the concept and thoroughly enjoyed the time spent building it. The SlowPoke Sport 40 proved to be a nice change of pace from the ARFs I've become used to, and the satisfaction of seeing my plane come together piece by piece was well worth the little extra construction time and effort. Plus, this plane is a lot of fun to fly. Its capabilities keep experienced pilots entertained, but its reactions are gradual and predictable enough for less experienced fliers to learn with and enjoy.

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* ✈

# Ultimate ready-to-fly trainer

*by Matt Boyd*

*With Hangar 9's camera mount installed, the Xtra Easy is off on another photorecon.*

**Drawing new people into our hobby is very important. An entry-level plane must be simple enough to permit an inexperienced modeler to build and operate it without getting discouraged. The model must be affordable enough to entice a beginner to join the hobby, and the package must have enough high-quality content to make him feel that it is a good value. The Xtra Easy from Hangar 9* strikes an excellent balance of these priorities. The name on the box says it all; everything about this plane makes building and flying easy for the beginner. People who start with the Xtra Easy are likely to be drawn into the hobby for a long time to come. And with the available extras (see sidebar), the plane will continue to entertain as the pilot's experience grows.**

## FLIGHT PERFORMANCE

After a quick check of the battery voltage and the Xtra Easy's balance, we fired up the MDS .40 engine and tuned it for a slightly rich mixture. The model's tricycle-landing-gear setup allows it to taxi easily to the takeoff point.

**• TAKEOFF AND LANDING**

The Xtra Easy needs about 80 feet of grass runway to get off the ground. Directional control is easy to maintain, and the model requires only a little right rudder to stay on track. Once the Xtra Easy lifts off, 45-degree climb-outs require no coaxing from the elevator. The model has built-in negative incidence on the horizontal stabilizer and built-in positive incidence in the wing saddle. To keep the angle of attack (AoA) from becoming too steep, apply some forward stick. Once at a safe altitude, I reduced throttle to ⅛ and added full down-trim to arrest the model's steep climb. In straight and level flight, the model is very stable.

The Xtra Easy lands like any other trainer: reduce the throttle to idle, set up the approach, and "grease" it in. If the throttle setting is too high, the Xtra Easy will fly right by you; make sure that the engine will idle low enough so you can slow the plane down during the final approach. There is plenty of control throw to handle most crosswind situations.

**• LOW-SPEED PERFORMANCE**

At a low throttle setting and full down-trim, the Xtra Easy flies slowly enough so a beginner pilot has time to think through his mistakes and correct them—altitude and a good instructor also help. The model has a slight, porpoising, low-speed stall from which it easily recovers a second or two after the stall occurs. The left wing has a slight tendency to drop, but that is easily corrected by holding some right rudder. The controls are very effective during low-speed flight.

**• HIGH-SPEED PERFORMANCE**

At full power, the Xtra Easy's high AoA limits its forward speed. With full down-trim, some forward stick pressure and a throttle setting of ½, the model moves through the sky quite nicely. It is not a speed demon, but it can easily approach 40 to 50mph. Because of the high AoA during climb, the power-on stall has a steep forward fall. If you let the angle get too high, this plane could fall over on its back. If this occurs, perform a ½ roll to right the model and recover.

**• AEROBATICS**

With little effort, the Xtra Easy performs nice, big loops and semi-tight barrel rolls. There is enough rudder authority to perform stall turns, but more rudder is needed to get the model to spin. Inverted flight requires full down-elevator and ½ throttle.

Overall, the Xtra Easy is a stable flying model, just as a trainer should be. The handling would benefit from some slight tuning of the wing and/or the horizontal stabilizer incidence to arrest the model's climbing tendencies.

HANGAR 9

# XTRA *Easy*

## SPECIFICATIONS

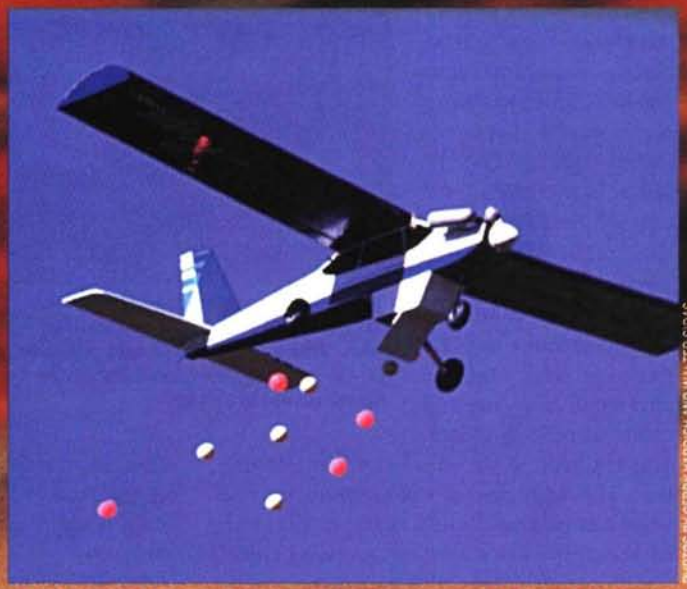
**Model:** Xtra Easy
**Type:** ready-to-fly trainer
**Manufacturer:** Hangar 9
**Distributor:** Horizon Hobby Inc.
**Wingspan:** 69 in.
**Wing area:** 793 sq. in.
**Weight:** 6¼ to 7 lb.
**Length:** 55 in.
**Engine used:** MDS .40 (supplied)
**Radio used:** JR XF421EX 5-channel computer radio, R600 receiver, 4 NES-517 servos (all supplied)
**Street price:** $380

**Features:** fully assembled fuselage; installed MDS .40 engine and JR radio gear with four mounted servos and battery; installed nosewheel and fuel tank; installed and hinged control surfaces with control rods attached; Ultracote covering; excellent instructions; JR 5-channel computer radio!

**Comments:** the Xtra Easy is a spectacular value, and a person with no modeling experience can easily put it together in less than one hour. Clean lines and sturdy construction make a sharp looking plane that should hold up well to the rigors of flight training. Flight performance is smooth and predictable, yet energetic when pushed. Over all, this is one of the best, most complete trainers I've seen.

**Hits**
- JR 5-channel computer radio included!
- Assembly is a piece of cake—all you need is a screwdriver and half an hour.
- Solid construction will survive training bumps and spills.
- Add-on accessories keep the fun going.

**Misses**
- One pair of holes was slightly off, and two screws were tough to place.



PHOTOS BY GERRY YARRISH AND WALTER SIDAS

***Bombs away! Hangar 9's drop box accessory adds to the fun you can have with an Xtra Easy.***

*The Xtra Easy comes as fully assembled as it can be and still fit in the box. Six screws, four washers and two wing nuts are all that's needed to attach the tail section, wing and landing gear. Then, you're ready to go!*

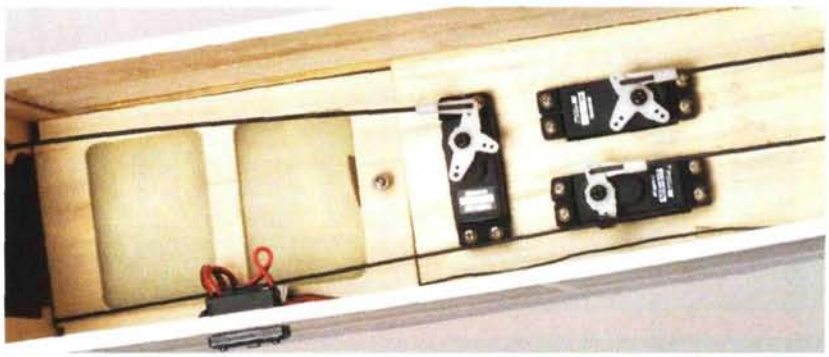
### WHAT YOU GET

Hangar 9 touts the Xtra Easy as "ready to fly in less than one hour," but most builders can do it in half that time. This is the most complete RTF I've seen, and Hangar 9 has assembled everything the confines of the box will allow. Only the wings, tail and main gear must be installed. The MDS .40 engine and fuel tank come installed, and the fuel lines are connected. All the servos, the pushrods, the receiver and the wiring come mounted, installed and labeled. The nosewheel is in place, and even the prop and spinner are ready to go. Hardware is included, but so little is needed that it's easy to overlook at first glance—six screws, four washers and two wing nuts don't take up much space! The JR radio is included, and battery packs for both the transmitter and receiver—installed, connected and ready to charge—round out the package. The plane is covered in Ultracote and clean, simple graphics. The Ultracote looks good right out of the box, although one of the graphics on the wing was peeling slightly at the corner. The instructions are detailed and well illustrated, and the radio booklet is just as good. Directions for the MDS .40 engine detail assembly, break-in, settings and care.

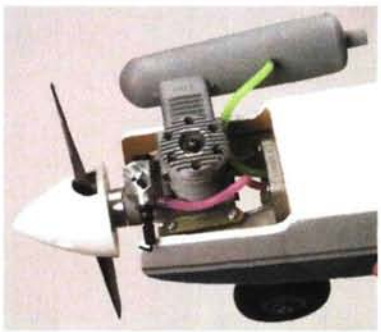
Opening the transmitter package reveals one of the nicest features of the Xtra Easy: the JR XF421EX computer radio. You read that right; this trainer comes with a 5-channel *computer* radio! The XF421EX is all the novice can ask for in a radio and more; it's doubtful that a beginner will use all of its functions right away, but it allows the pilot to do more as his experience grows.

### ASSEMBLY

The assembly (what little is required) is straightforward, and the instructions are very good; lots of detailed but uncluttered pictures along with step-by-step directions. The first step is to assemble the wing. A supplied aluminum tube approximately 12 inches long serves as the main wing support. Simply slide the tube into the hole in one of the wing halves, twisting gently to work it all the way in. Repeat with the other wing, again twisting until the wings fit snugly together. A pin at the rear of one wing half fits into a slot on the other and prevents the wing from rotating on the tube. When the joint between the wings is tight, seal it with the supplied clear wing tape.



*The radio box is roomy and the servos and control rods have already been installed. The receiver and the battery pack are under the foam pad at the front of the radio compartment.*



*The MDS .40 engine comes installed, along with the fuel tank and the fuel lines. This engine was simple to break in, ran smoothly and provided strong performance in the air.*

The aileron linkage on the wing half with the servo comes already attached. Snap the remaining linkage onto the control horn on the other wing half. Each linkage has a narrow piece of tubing around it (effectively a tiny rubber band and referred to as a "clevis keeper" in the instructions), which is slipped over the clevis to prevent it from popping off the control horn during flight. Once the clevis keepers are in place the wing assembly is done.

Assemble the tail next. Install the vertical stabilizer onto the horizontal stabilizer by sliding the threaded rods on the bottom of the vertical stab through the holes in the horizontal stab. There are two sets of holes in the horizontal stab, so be sure you use the forward pair. The holes are easy to distinguish because the rear set has blind nuts installed, and instructions clearly illustrate the proper placement. I had a bit of trouble because the spacing of the holes didn't quite match that of the rods. It was close enough that neither hole required redrilling; I gave each 10 or 12 twists by hand with an ⅛-inch drill bit to shave just enough off the hole for the rods to slip through. Next, slip a washer over each rod, dab a drop of the included thread-lock on the threads, and tighten a wing nut on each to secure the stabilizers together.

Now, slip the tail assembly into the groove on the top rear of the fuselage. Make sure the rudder pushrod is above the horizontal stab. When the tail assembly is securely seated, slip a washer over each of the two small screws supplied. Apply some thread-lock, and place the first screw on the tip of a magnetic Phillips screwdriver. Carefully slide the screw into one of the holes in the bottom of the fuselage below the tail assembly, and push it up until it meets the blind nut in the bottom of the horizontal stab.

Even with a magnetic screwdriver, this step is tricky because the elevator pushrod is directly in the way and will knock the screw off the driver. Also, the holes in the fuse are a very tight squeeze; I had to trim a bit of the cover that intruded into the screw holes before the washer would pass through. I illuminated the inside of the fuselage from the opening at the back with a pocket flashlight so I could align the screw with the blind nut and avoid the elevator pushrod. This took several tries, but the screws threaded easily once they were properly aligned.

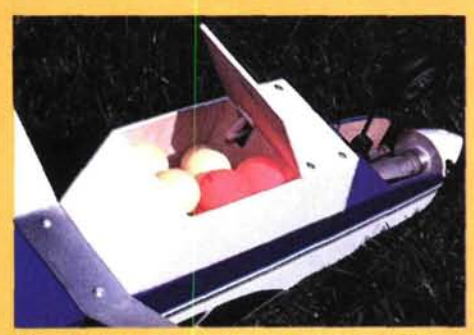
Even with a dab of thread-lock on each screw, vibration loosened the tail-securing

# Accessories

In an effort to make the Xtra Easy more appealing and more versatile as the pilot's skill grows, Hangar 9 has come out with three bolt-on accessories for its trainer. The camera mount, glider launch and drop box each add an extra dimension of fun to the Xtra Easy. Best of all, these items aren't just afterthoughts; the Xtra Easy itself is designed with built-in blind nuts at the accessory mounting points. Installation is fairly easy, but requires a bit more work than assembling the plane itself. You will also need servos for each (I used JR's NES 507).

*In flight, the camera worked flawlessly; we were able to take some great high-altitude shots of the flying field.*

*Even missing one cross-brace, the launch was sturdy enough to hold a glider securely—proof that with a little refinement, the launch should work well.*



*The drop box was my favorite accessory for the Xtra Easy. The box is rugged and is big enough for a variety of payloads.*

• **Camera mount.** The three-piece aluminum camera mount comes mostly assembled and is mounted on two of the installed blind nuts in the bottom of the fuselage. A hole must be drilled for the servo lead to pass into the fuselage. The supplied double-sided tape and rubber bands hold the camera and servo securely, and the mount is double-hinged to allow a variety of photo angles.

You must provide your own camera. I chose a camera with auto-advance and was able to shoot a whole roll in one flight. Manually advancing disposables will only take one photo per flight.

*The camera mount is bolted right up to two blind nuts in the bottom of the fuse.*

• **Glider launch.** This can really expand the modeling possibilities for the Xtra Easy owner as his experience grows. I had several problems with my glider launch. One of the mounting holes had not been predrilled in the wood frame, and the aluminum tubes that serve as the cross-braces had been improperly tapped at the ends. The holes were off-center and unthreaded, causing one screw to shear off and several others to thread improperly. After some work on the aluminum tubes, I was able to put the launch together minus one cross-brace, and the design looked and felt reasonably solid. However, the screws and cross-braces need refinement to measure up to the rest of the Xtra Easy.

• **Drop box.** The drop box was a blast at the field. Its design is simple, sturdy and effective. The construction is a bit more involved than the camera mount's, but certainly not difficult. It uses the same servo-lead hole and the same mounting points as the camera mount. I would like to have seen hardwood servo-mounting blocks instead of laminated ply, which partially split when screws were driven in despite the fact that I had predrilled the holes.

Aside from that (and a front mounting screw location that requires disassembling the servo mount to remove the drop box from the plane), the box went together smoothly and performed flawlessly. Like the other two accessories, the drop box uses the auxiliary channel on the JR radio and has very positive action. The door opens crisply, and is wide enough for many types of cargo. I used 11 painted Ping-Pong balls for the first drop, and everything worked great. The box is tough, too; after one bombing run, I forgot to close the box door before I landed (good thing this plane doesn't have retracts!). No problem, though; there wasn't a scratch on it. I mounted my box without the front screw to make removal easier, and it was plenty secure with just three screws.

These bolt-ons are fun additions to the Xtra Easy, and they give owners new ways to enjoy their airplane as they gain piloting skill. The camera mount and the drop box were great fun at the field, and their simple, solid designs fit well with the Xtra Easy concept. The workmanship on the glider launch wasn't quite up to par, but with a little refinement, it should work well. Together these accessories will make your Xtra Easy enjoyable to fly long after you've outgrown its trainer function.

nuts during my first few flights. I recommend liberal use of thread-lock and, perhaps, lock-washers in place of the provided standard washers to better secure the tail.

When the tail assembly has been firmly mounted, connect the rudder and elevator pushrods on the outermost holes of the control horns and secure the clevis keepers.

The main landing gear is next, and installation couldn't be simpler. Add a drop of thread-lock to the last two screws, line up the holes in the gear with the holes in the bottom of the fuselage, and tighten everything up. The gear is made of sturdy aluminum, so it will survive the inevitable hard landings of those first few training flights.

All that is left to do is to attach the wing using the supplied wing hold-down dowels. Slide the dowels into the two holes in the fuselage, twisting as was done with the wing-support tube. I found the holes a bit undersize, so I enlarged them slightly, after which the dowels fit perfectly. For added security, I dabbed some glue on the dowels to prevent them from working loose over time. Now, plug the aileron servo connector into the connector marked "aileron" in the fuselage and center the wing onto the fuselage. When it's seated properly, stretch the supplied rubber bands across the wing and slip them over the dowels. Congratulations, you've just assembled the Xtra Easy.

## FINAL THOUGHTS

Hangar 9 has really gone all out with the Xtra Easy to provide beginners with the resources necessary to join the model aviation hobby. Learning to fly takes patience and practice; eliminating all the minor complications and distractions of model construction leaves the new pilot free to concentrate solely on learning to fly. The Xtra Easy provides the beginner with everything he needs in one easy-to-afford, easy-to-assemble, high-quality, high-value package. In conjunction with a good teacher, it makes the perfect introduction to RC aviation.

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* ✈

# HIROBO Shuttle SXX

*by Rick Bell*

## *Enhanced performance with CCPM control*

It never ceases to amaze me how Hirobo* can develop a product like the Shuttle 30-class helicopter, and over the years, continue improving and changing it to meet modelers' demands. From the top-of-the-line Shuttle ZXX to the budget-minded Shuttle Z-TS and the Shuttle Challenge for beginners, whatever you want in a 30-size heli can be found with a Shuttle. The newest Hirobo Shuttle, the SXX, offers the popular CCPM (cyclic, collective pitch mixing) format that Hirobo calls SWM (swashplate mode).

By using CCPM, the control systems on helicopters are simplified by reducing the number of linkages, bellcranks and pushrods needed to operate the rotor head. Collective pitch and cyclic mixing are now accomplished electronically, rather than mechanically; this, in turn, minimizes slop and play in the control system and makes the heli "feel" tighter. The Shuttle uses a swashplate with three "120-degree" pickup points, so three servos are used for cyclic and collective pitch control. Two servos are used to tilt the swashplate for roll, and all three servos (mixed together) provide elevator and collective pitch control. Besides simplifying linkage setup, CCPM directs more servo power to the swashplate; you have three servos moving the elevator cyclic instead of one. Another benefit is less maintenance.

## SPECIFICATIONS

**Model:** Shuttle SXX

**Manufacturer:** Hirobo

**Distributor:** Altech Marketing*

**Main rotor diameter:** 48.8 in. (1,240mm)

**Length:** 42.3 in. (1,075mm)

**Radio used:** JR 10X with DS8231 servos

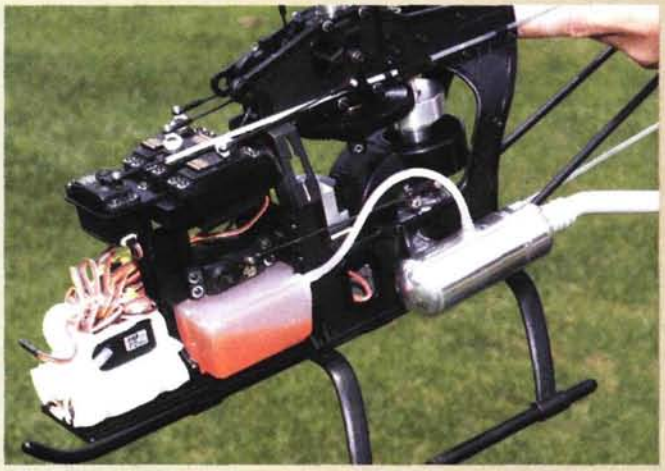
**Engine used:** Enya .35X TN type

**Gyro used:** JR Piezo G450

**Street price:** $369.95

**Features:** the SXX has the cyclic, collective pitch mixing (CCPM) control system, ball bearings on all pivot points, a one-piece canopy, a Shuttle RG-style tail fin and stab, decals and an illustrated instruction manual.

**Comments:** the Shuttle SXX is a good, solid performing helicopter. It's easy to build and maintain and looks great. Because it uses many of the same parts as the Shuttle ZXX, replacement parts are readily available. The setup values in the manual are a good starting point and work well. The CCPM system is also easy to set up and provides a good feel to the helicopter.



**Hits**

- CCPM control system.
- Easy to build.
- Ball-bearing pivot points.
- Very good instructions.

**Misses**

- Main rotor could be a bit heavier.

***Here, you see the general chassis frame layout. Everything is well thought out and easy to reach. I broke in my engine before assembling and installing the drive assembly.***

PHOTOS BY WALTER SIDAS

*The Shuttle SXX is very similar to the ZXX with the exception of the CCPM cyclic/ collective control system. Note that there are only three ball connections to the swashplate.*

### KIT CONTENTS

The SXX is typical of Hirobo's high-quality kits. All parts are grouped in numbered bags for each construction step, the one-piece canopy requires only decal application and the weighted, main-rotor blades are finished and ready for final balancing. The tail boom comes covered with white heat-shrink film for a classy look. The instruction manual is very detailed with many illustrations. Although there are few written instructions, the clarity of the drawings makes assembly easy. One nice feature is the CCPM setup detail that's provided. Because the controls are mixed electronically, the servos need to move in unison and the manual is very clear about how everything should work, including details for mode-1 and mode-2 transmitters.

The main rotor head, chassis, transmission and tail rotor are the same as on the Shuttle ZXX, and all moving parts are supported with ball bearings. Except for the control layout, SXX is the same as the ZXX, which means you know that the model is well proven.

### CONSTRUCTION NOTES

Because so much of the SXX is the same as the ZXX, I'll cover those areas that need special attention in the construction. First is the cyclic/collective system bellcrank assembly—two for aileron and one for elevator. Be sure to use the tiny shim washers in between the bearings in the aileron bellcranks; they prevent the bearings from binding when tightened down. Three main bearings are now pressed into the chassis. Make sure they are tight in their sockets; if they don't fit tightly, use 5-minute epoxy to secure them.

The aileron bellcranks and each half of the elevator bellcrank are mounted to stays that are screwed to each of the chassis halves. Again, don't forget to use the tiny shim washers where indicated. I then assembled the halves and captured the elevator bellcrank between them, making sure the elevator bellcrank halves mated properly before I screwed the chassis together. All bellcranks should move freely without binding.

The seesaw, flybar and main-rotor head are assembled next. I encountered no problems; just be sure to center the flybar in the hub and use thread-lock where indicated. I also added an ⅛-inch wheel

## FLIGHT PERFORMANCE

When I went to the flying field, I brought both the stock blades and a set of fiberglass blades from my Shuttle RG to help evaluate the aerobatic performance of the Shuttle SXX.

For the first flight, I slowly advanced the throttle until the heli was ready to lift off. At a little above half throttle, the SXX sits nicely in hover. The trims were just about perfect, as was the blade tracking, but the gyro gain was too high and I had to make some adjustments. Head speed was also a little too high for hover and I slowed it down slightly. With everything as it should be, I started to move the SXX around to get a feel for the control response. I was expecting the model to feel like any other Shuttle that I have ever flown, but I was very surprised. Handling is very precise, smooth and balanced—more like a larger heli.

After a few tanks of hovering around, I engaged the "idle up" switch and went off into forward flight and tried some aerobatics. Using the recommended setup values, basic aerobatics such as rolls, loops and 540 stall turns are easy to do. The flybar paddles are on the heavy side and provide good stability for hovering and forward flight. For all-out 3D maneuvers, they should be exchanged for a lighter set. The stock main-rotor blades work well and provide good maneuverability. At 105 grams, however, the blades are too light for practicing autorotations. Heavier fiberglass blades retain their energy better and improve the model's autorotation performance.

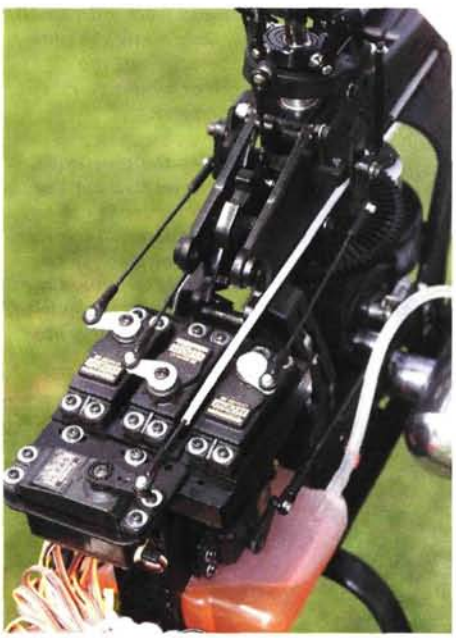
collar to each side of the flybar to aid in balancing later.

Some of the control ball attachments are longer than the others on the swashplate, so be sure to install them in the correct positions and use thick CA to secure them. The washout unit is a standard tried-and-true Shuttle ZXX unit that poses no installation problem. After you've installed the fuel tank and radio tray along with the main shaft, main gear and rotor head, install the main gear. Pull up on the drive gear and then tighten the mast lock-down collar in place so there is no up or down play in the main mast.

***The tail-rotor assembly is belt-driven, and the fin and stab are Shuttle RG-style. Make sure you twist the tail-drive belt in the correct direction; otherwise, the rotors will turn backwards.***

After snaking the drive belt through the tail boom, I built and balanced the tail-rotor assembly and tail gearbox, and I secured them to the tail boom. I then attached the tail boom to the chassis along with the clutch assembly and the drive pulley. To prevent the tail rotor from turning backwards, make sure the drive belt is twisted 90 degrees in the proper direction.

Before I installed the engine and clutch in the chassis, I ran a few tanks of fuel through the engine on a test stand to break it in and adjust the carb. I also balanced the cooling fan and clutch bell before installing them on the engine. I used a dial indicator to check the assembly's runout. The manual doesn't mention these important tasks, but they should be done for smooth running. To complete the basic helicopter assembly, I installed the engine/clutch assembly, muffler, landing gear, boom supports, tail rotor pushrod and tail fins.



***The servos are at the front of the body frame, and the linkage uses ball links at all connection points. The bellcranks have ball-bearing pivots.***

## RADIO INSTALLATION

Assemble all of the pushrods using the dimensions shown in the manual, and then attach them to their respective bellcranks and levers on the heli. Install the servos, the gyro and RX switch. Use high-quality servos for the cyclic control, as any servo output slop will show up in the CCPM control system. After programming my radio for 120-degree CCPM mixing, I turned on the radio and receiver and moved the sticks to check for correct control movement and found that some of the stick commands did not produce the correct swashplate movement. To correct the mixing, I needed to change the aileron and pitch values in the radio from positive to negative. The initial setup was very easy to accomplish, and I made final adjustments to the throttle and pitch curves during my first flight at the field.

## FINAL THOUGHTS

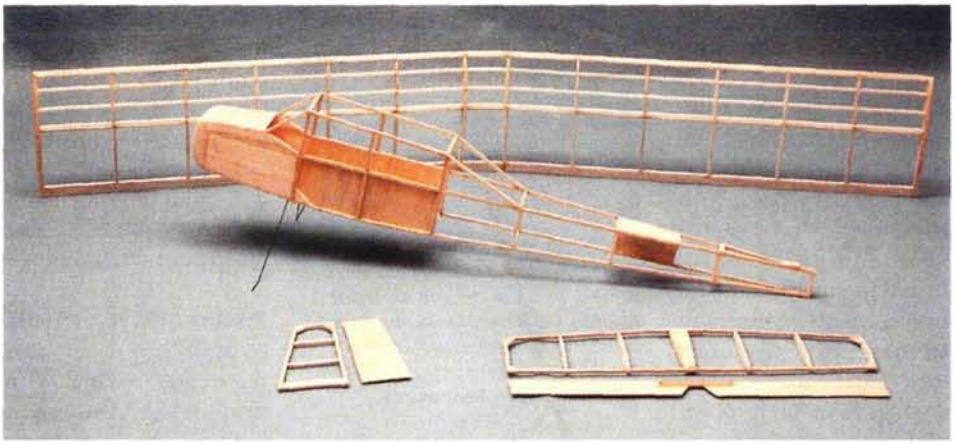
The Hirobo Shuttle SXX is a very easy helicopter to build and fly. Given that it's a descendant of the Shuttle ZXX, I expected nothing else. The CCPM control system is a new experience for me, and I am very impressed with it. The setup is easy, but you do need a computer radio that offers CCPM programming (found in most, if not all, newer heli radios). Flight performance is better than that of the ZXX because the control system is tighter and has a faster response. From learning to hover to aerobatics and mild 3D maneuvers, this heli is a winner!

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* ✦

# Cover small models with tissue

## *A new twist for a classic technique* by Dave Robelen

If you've become involved with RC airplanes only in recent years, there's a good chance that the only covering materials you have used have been the iron-on sort. Now, however, with the increasing popularity of slow flyers and park flyers, the tissue-paper covering is a very attractive option. Tissue is very light, definitely economical, reasonably easy to repair and can be very attractive. I'll take you on a "tour" of how I apply colored tissue covering with a clearcoat on a typical lightweight model, and I'll tell you about some of the tools and materials involved.



***The author's own design—Pokey—is ready to cover. Be sure to smooth the entire frame with 220-grit sandpaper before covering it.***

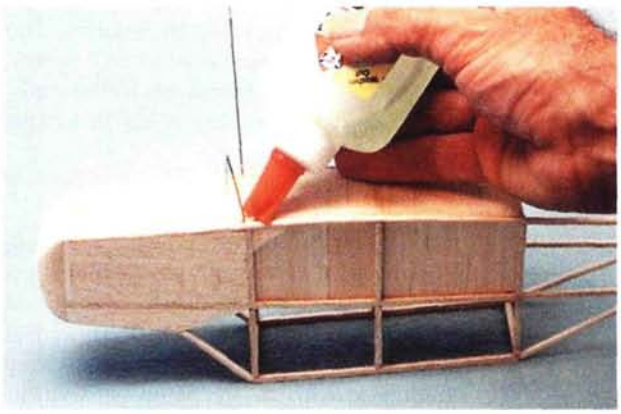
### YOU'LL NEED

First, note that there are different types of tissue paper. The sort found in craft and gift shops can be bought in a multitude of colors, but it's too heavy and too difficult to work with as a model covering. True Japanese tissue that is intended to cover model airplanes is available from just a few sources: Peck-Polymers* offers a very nice grade that is available in a variety of colors and is pleasant to work with; the other main choice is Esaki tissue that is normally sold by Campbell's Model Supply*. Esaki tissue is the lightest grade that comes in a choice of colors and is also quite reasonable to work with.

Although modern tissue is the same as it was many years ago, the materials for adhering and coating it have undergone a major change. Formerly, you had to coat a project's framework several times with a model dope and then use more of it to fasten the tissue in place. Still more dope, thinned down, was used as a coating to seal the tissue. This process usually required brushing the dope onto the tissue and was often quite time-consuming. This method still works fine for those so inclined, but the system I describe uses several craft materials that are available from most craft stores.

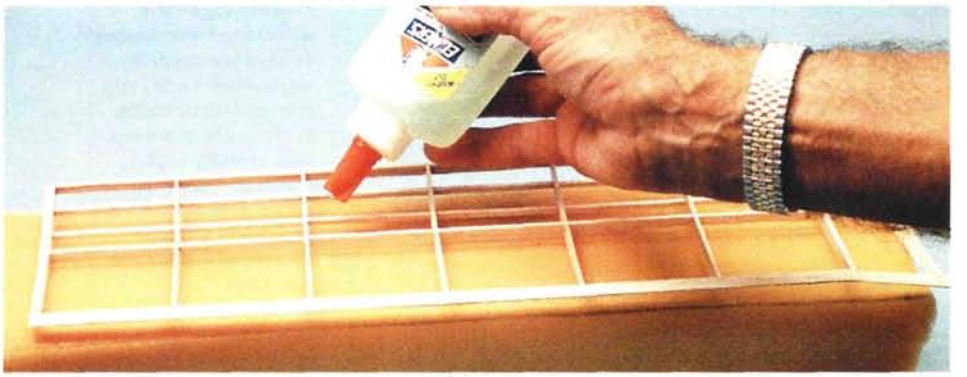
I have found Elmer's School Gel excellent for bonding the tissue to the framework. The smallest amount is adequate, and the bond becomes permanent within a short time.


***The basic materials needed for tissue covering. You can use rubbing alcohol or the type sold in hardware stores. Be sure your cutting tools are very sharp.***



***Left: apply the glue in a very thin layer and work with small sections. Only apply the glue around the edges of the framework or where you'll cut an opening later.***

***Below: before the glue dries, notch the tissue to clear the wire gear and smooth out any wrinkles. You can pull the tissue from opposite edges to tighten it. Avoid wrapping the tissue around corners; instead, cover a fuselage in separate panels.***



***When you cover an undercambered wing, apply the glue only to the middle spar. Again, cover in panels, starting with the bottom and then going on to the top. Remember, the tissue will bend only in one direction until you attach it.***

***Attach the covering to the bottom spar, then fold it back onto itself to apply glue to each rib bottom and to the edges. The top covering should be attached only around the edge.***

### COVERING TIPS

Prepare the framework by lightly sanding all over with 220-grit sandpaper to remove all glue bumps and irregularities. Starting with the wing, cut the tissue into panels so that you can cover a single segment at one time, e.g., left bottom; right bottom. Do not try to wrap the tissue around to cover a second panel with one sheet; this is the path to warps and wrinkles. Tissue has a "grain": its fibers are aligned in one direction on a sheet. Since the tissue shrinks more across the grain, we want these fibers to run across the wing panel to best preserve the airfoil shape.

Tissue is usually attached only around the edges, but there is an exception with undercambered wings. Here, the tissue must be fastened to all of the exposed structure. Cover the bottom first, initially attaching the tissue only to the center spar. Apply the glue very sparingly to avoid having excess weight. After you've attached the tissue to the spar, cover the bottom front and then the rear of the panel. Repeat until you've covered the bottom of the wing. Cover the top of the wing by attaching the tissue only to the edges. Draw out any slack or wrinkles before the glue hardens to avoid having warping or wrinkles later. After the glue has dried, you can trim the edges with scissors or a sharp blade and smooth them with fine sandpaper.

Rubbing alcohol lightly sprayed on does a fine job of shrinking the tissue just the right amount. Be sure to pin the wing to a flat board (with suitable props) to prevent it from warping as it shrinks. Krylon Crystal Clear spray lacquer does a fine job of clearcoating; two light coats are usually adequate.

Covering the fuselage is pretty much a repeat of the wing: work in sections and don't wrap the tissue around corners. To cover simple compound curves, first moisten the tissue with water to help it stretch into place. For really complex curves, occasionally, you may need to slice the tissue into strips to help it lay down properly. Again, clearcoat with two coats of lacquer. Elmer's white glue will hold clear plastic windows and windshields nicely in place, and it dries clear.

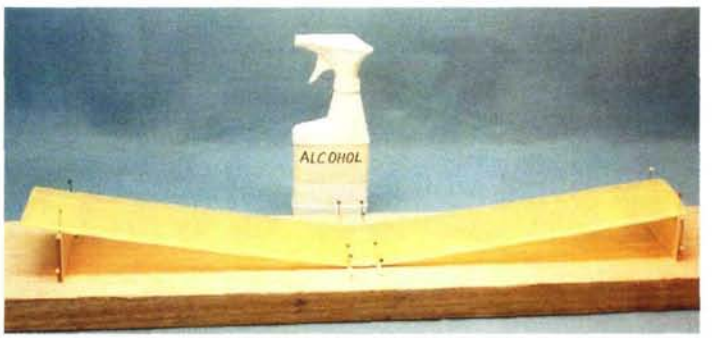
When you apply tissue to sheet balsa, first spray two coats of lacquer onto the balsa, then lay the tissue in place and brush acetone over it. Rub the part smooth with a fingertip, and the tissue will bond nicely.

The delicate tail frames are a special case because they can easily become warped. To deal with this, first bond the tissue onto a sturdy frame, then shrink and coat it on the frame and let it dry for a couple of days. Then cut out pieces of the precoated covering and lightly glue them onto the tail frames.

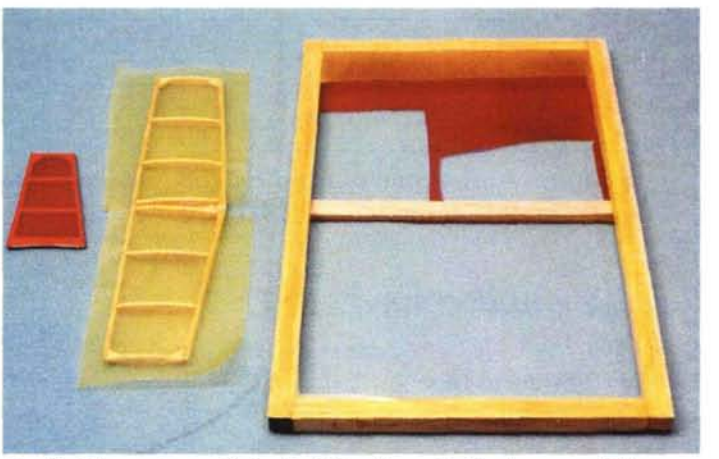
Because the tissue will continue to shrink for several days—and occasionally longer—you should clamp parts such as slender wings to a board while the glue is curing.

### TRIMMING AND REPAIRING

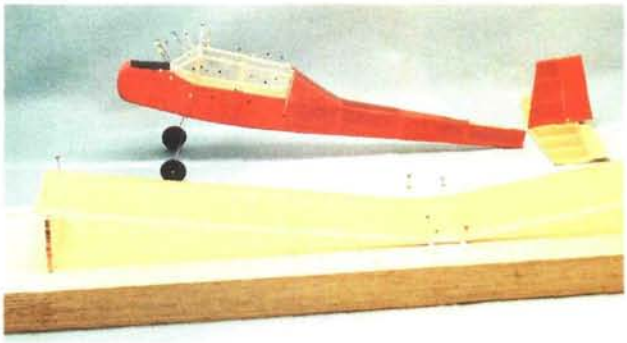
To bond tissue trim to the tissue covering, use acetone to soften the lacquer, then apply the trim pieces and respray. For small trim work, felt-tip pens can be very useful to add a touch of color.




***After the glue has dried, lightly spray the tissue with alcohol and clamp the piece you're covering to the board until it is thoroughly dry. If left free, the wing is likely to warp. Follow the same procedure when you apply the lacquer clearcoat.***



***For flexible surfaces, first attach the tissue to the frame, and then shrink it with alcohol, spray it with lacquer and let everything dry for a few days. Then cut tissue panels out of the frame and attach them to the tail.***

*Coming together! Allow the fresh lacquer to cure for several days. Meanwhile, you can add other parts, such as the windows and wheels, to the fuselage. Elmer's white glue does a very satisfactory job of attaching the plastic windows.*

*Spray two coats of lacquer onto the control surfaces and lightly sand away the "fuzz." Attach the tissue by using a brush to apply enough acetone to soak through. Rub smooth with a fingertip, and promptly do the other side.*

*Let's go flying! Although my Pokey is a modern RC model, it could pass for a rubber-powered model from the 1930s.*

Damaged tissue may be repaired in several ways. If the tear or puncture is small, a thin layer of Testor's* model cement applied across the tear will pull it closed as it dries. For larger damaged sections, use a sharp hobby knife to trim away the damaged part and glue fresh material into place.

If you have more questions, please contact me c/o *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4066 USA, or email man@airage.com, and I will be glad to help.

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* +

MODEL AIRPLANE NEWS
READER'S
GALLERY

# Sikorsky S-39B

*by Matt Boyd*

The Sikorsky S-39 was first produced in 1930 as a scaled-down version of the commercially successful S-38 amphibian, and despite being produced in relatively few numbers, the S-39 developed quite a reputation. During WW II, it saw duty with the Civil Air Patrol, primarily for air/sea rescue missions. One such plane—the one Paul Donofrio modeled his after, and one of only three S-39s surviving today, on display at the New England Air Museum in Windsor Locks, CT—earned the first Air Medal ever awarded to a civilian. The S-39 was powered by a single Pratt & Whitney 300hp Wasp Jr. engine—the first aircraft to use this powerplant—and it carried one pilot and four passengers. It had a wingspan of 52 feet and a gross takeoff weight of 4,000 pounds.

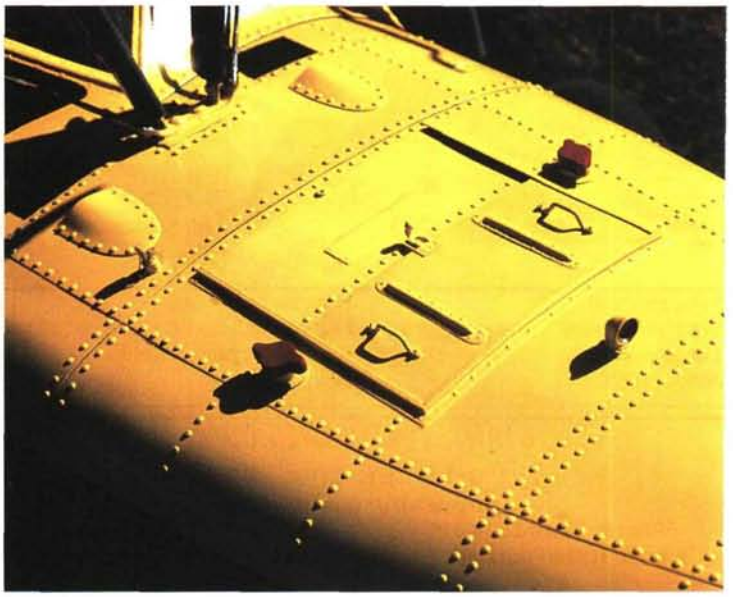
## SPECIFICATIONS

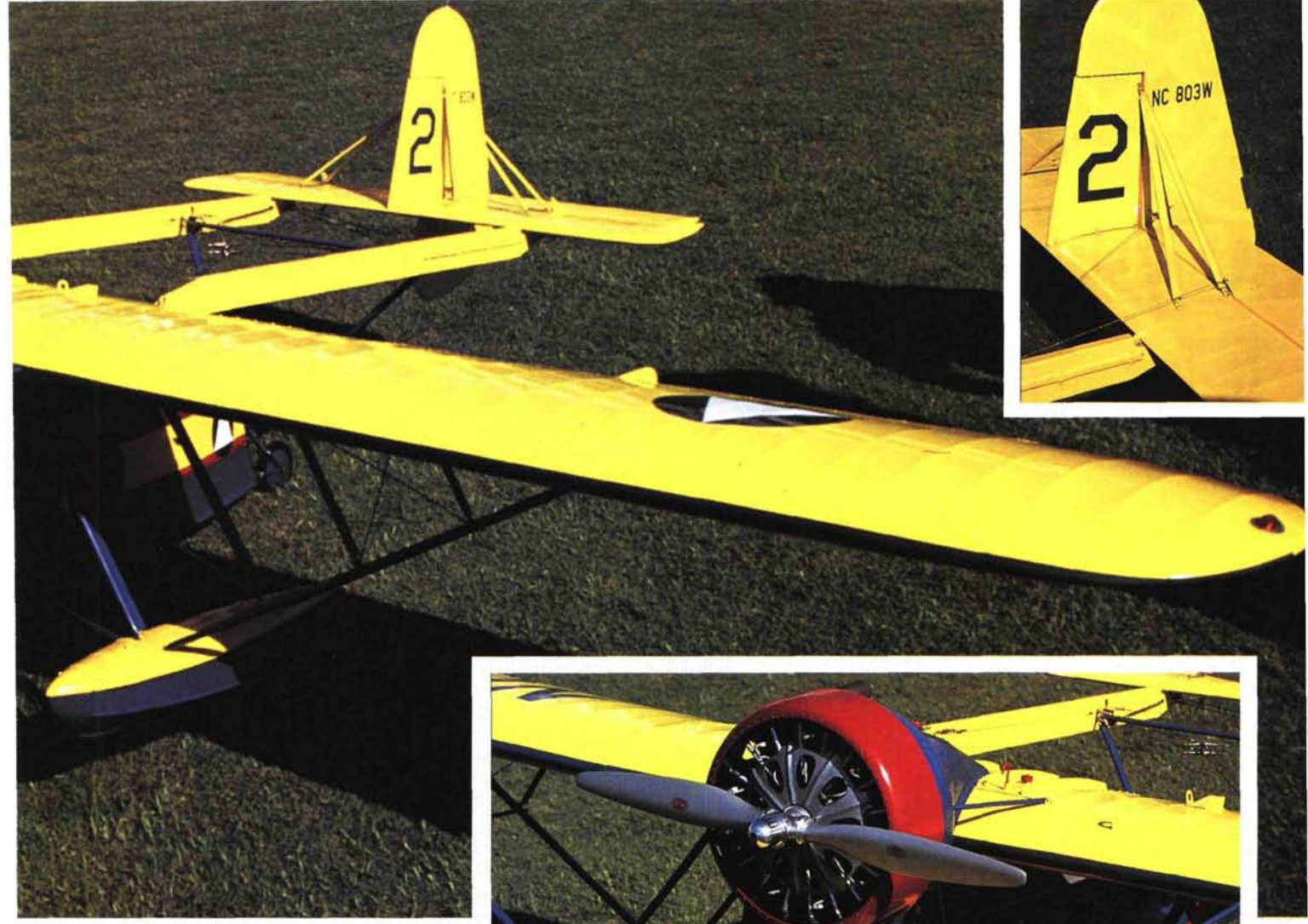
**Model:** Sikorsky S-39B amphibian
**Type:** Civil Air Patrol air/sea rescue plane
**Scale:** ¼
**Wingspan:** 156 in.
**Weight:** 45 lb.
**Power used:** B&D 6.1ci gas engine
**Prop:** Syntec adjustable pitch
**Radio used:** Futaba
**Time to build:** 2½ years

The *Model Airplane News* staff got its first look at Paul Donofrio's fabulous Sikorsky S-39B amphibian at the 2000 Top Gun competition. Paul and his teammate (and fellow Cape Coral Sea Hawk) Anthony Greco placed 11th in the Top Gun team competition. That feat is even more impressive when you consider that this was the first time the model had competed in a scale contest. Paul's model also garnered him the first Charlie Chambers Memorial Craftsmanship award and the award for Engineering Excellence.

Paul's inspiration for the project came from the full-size S-39B on display in the Civil Air Patrol exhibit at the New England Air Museum. Determined to do justice to the full-size plane with this project, Paul set about collecting as much material as he could. The museum finished its restoration of the original in 1996 and was able to provide extensive documentation, which Paul used to plan his model.

Paul's Sikorsky is completely scratch-built, and the construc-








tion is an amalgam of built-up foam, fiberglass and lite-ply. Paul's crew member at Top Gun, Bill Hoffer, described it as using "every substance imaginable for a model plane." Paul constructed the fuselage using fiberglass cloth over foam. The plane has a fully detailed interior, including seats, controls and gauges. No effort was spared to preserve authenticity; all the hatches are scale and open just like the originals, right down to the retractable passenger grab bars. The plane features full rib stitching, and the surfaces are covered in Sig Coverall and Randolph dope.

One of the most beautiful examples of craftsmanship on Paul's S-39 has to be the rivet work. Paul used authentic aircraft rivets—the smallest available to preserve the scale look—and drove them into a homemade sheet-metal jig. He then ground them down, removed them from the jig, and placed them on his model. In all, there are more than 9,000 rivets on the finished model!

Paul scratch-built his own fully functioning retractable gear from steel and aluminum, re-creating the original with impressive accuracy. The gear servo is mounted in the fuse—or hull—but the throttle and control servos are mounted in the wing. They actuate the controls via U-joints and push/pull cables rigged to a pulley system.

Paul knew that the key to a scale appearance would be the engine, since its location leaves it fairly exposed on the wing. To retain the original look, he crafted a scale shroud and a scratch-built engine mock-up, including heads, plugs and exhaust manifolds. All this hides a B&D 6.1ci gas engine, complete with electronic ignition. A Syntec adjustable-pitch prop finishes off the power system.

When it came time to paint, the original documentation provided him with the manufacturer and colors used by the Civil Air Patrol. The paints are still available, so Paul was able to obtain the exact colors for his model. Operational navigation lights give the S-39 that final scale touch. Paul controls his masterpiece with Futaba radio gear.

Paul plans to campaign the S-39 at more shows and competitions in the future, and we're sure that he'll collect a few more awards when he does. ✈

MODEL AIRPLANE NEWS
**HOW TO**

# ELECTRIFY the Global Blue Max ARF

## *Simple steps for success*

*by Tom Hunt*

*Editor's note: following the tremendous response to Tom Hunt's February 2000 article in* Model Airplane News *on converting the Kyosho Super Stearman ARF to electric power, we asked Tom to write a similar article on how to convert the Global Hobby Distributors Blue Max to e-power. Here's another of his success stories.*

### SPECIFICATIONS

**Global Blue Max Electric Conversion**

**Wingspan:** 67.25 in.

**Length:** 49.5 in.

**Wing area:** 756 sq. in.

**Glow flying weight:** 5 lb., 5 oz.

**Electric flying weight:** 7 lb., 2 oz.

**Glow power req'd:** .40 to .60 2-stroke or .52 to .70 4-stroke

**Motor used:** modified DeWalt 14.4V cordless tool motor with Modelair-Tech H-1000 belt drive at 3.1:1.

**Prop used:** Zinger* 15x8 wood

**Battery used:** 16, 2000mAh Ni-Cds

**Current at full throttle:** 29 amps

**Rpm at full throttle:** 5,300

**Radio equipment used:** three Futaba* S-3003 servos, 1 Micro Star 40A ESC (may not yet be available in U.S.; you can use AstroFlight* 204D), Futaba R-127 receiver and Super 7 transmitter.

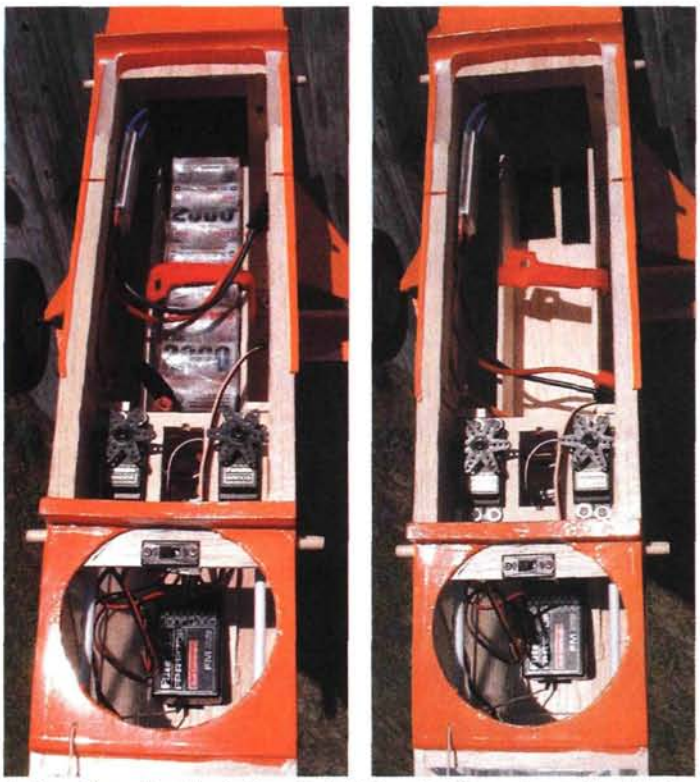
**Comments:** because the Blue Max has low wing loading and is a well-built ARF of mostly balsa that's sheeted sparingly, it's a great subject to convert to electric power. By substituting lighter wheels and reducing a bit of its drag, the Blue Max will continue to provide plenty of performance.

***Modelair-Tech H-1000/DeWalt 14.4 belt-drive motor system installed on supplied beams. Hole behind motor is for cooling air entrance to battery compartment.***

The Global Hobby Distributors* Blue Max ARF is a non-scale model of what *might* have been flying in the late 1910s. Its low-wing-loading, WW I-type design makes it look like a perfect candidate to convert to electric power. The model is advertised to be powered with a .40 to .60 2-stroke or a .52 to .70 4-stroke glow engine. The advertised weight (with glow power) is about 5.5 pounds. I have always told potential glow-to-electric-conversion-minded modelers to expect a weight gain of a little less than the weight of the intended motor

battery. Experience tells me that this model will need about 16 to 18, 1700 to 2000mAh cells to fly well (about 2 pounds). This would make the ready-to-fly electric model weigh just a little more than 7 pounds. The model sports a 67-inch-span wing with 756 square inches of area, with about a 15-percent chord. This puts the wing loading at 20 to 22 ounces per square foot—a comfortable level for most intermediate pilots.

Weight and drag are an electrics modeler's worst enemies. Because it's an ARF, there are very few things we can do to reduce the weight. Let's assess the Blue Max and see what can be done.



***Left: radio and motor battery installation. Radio equipment had to be moved aft to accommodate the 16-cell, 2000mAh pack under the wing for correct CG placement. Right: battery removed showing shallow battery box and hold-down strap.***

### LOSE WEIGHT QUICKLY

The Blue Max is well built and rugged but does not suffer the fate of many other ARF models: it does not contain a lot of heavy lite-ply (an oxymoron if I ever heard one!) The fuselage is a built-up structure of mostly balsa sticks, with balsa sheeting in the forward section only. Plywood is used conservatively, only found in the landing-gear mount and the firewall. Although very attractive, the 5-inch spoked wheels supplied in the kit are very heavy—7.5 ounces for the pair. I substituted 4.5-inch Dave Brown* Lite Flite wheels for a net weight savings of about 3.5 ounces. The spoked wheels would also have had a higher parasite/form drag than the Lite Flite wheels, but more about drag later.

Most of the weight of any electric model (other than the motor/battery) is the RC equipment and the hardware that holds the aircraft together. Many inexperienced modelers try to use small micro and sub-micro-servos in large models to save weight. This is *not* a good idea, even if the torque value of these servos is high. Granted, the air load on the servos is much lower owing to the generally slower speed of this type of electric model, but many times the air load isn't the highest load a servo experiences! Many small, high-torque servos have fragile gear trains; they can take a high steady-state load, but shock loads (such as a hard landing) or control-surface flutter can reduce these gear trains to dust. It is best to use "standard" servos in this type of model. Of course, only three are needed: one for the rudder, one for the elevator and one for the ailerons. The throttle servo will be replaced by the electronic speed control (ESC), which is probably lighter than the servo, pushrod and empty fuel tank that's usually installed in the glow-powered version. You could save weight by installing a smaller Ni-Cd receiver pack of lower capacity or a similar capacity NiMH pack of the same capacity, but this won't amount to more than an ounce.

As you can see, other than the wheel substitution, there is not much we can or should do to lighten this model.

***The landing-gear wire was "faired" to reduce drag of the model. Simple balsa sheet fill is in the front and rear leg, and balsa trailing-edge stock was used for the lower spreader bar.***

### IT'S A DRAG

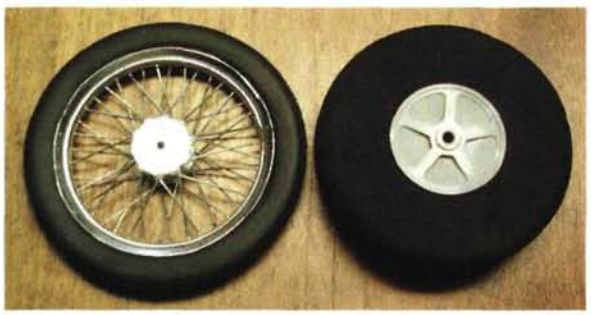
The Blue Max is a parasite/form drag glutton! The glow engine was intended to be cantilevered off the firewall and left out in the open. We could do this with the motor/belt-drive power system and provide maximum cooling, however, this is where a lot of drag can be removed. The simple box "cowl" I created over the motor/belt drive will reduce the drag considerably. The next place to reduce the drag is the landing-gear wires. The "open air," unfaired, landing-gear wires account for nearly half the parasite/form drag of

## ELECTRIFY THE BLUE MAX

*The author made an ⅛-inch-thick sheet balsa cowl to cover up the drive and reduce drag. The radiator-like cover in the front of the cowl is made out of plastic window screen. Cooling air for the motor and battery is more than adequate. The wooden prop shown is a 15x8 Zinger.*

the entire model! Adding a balsa plate between the front and rear leg and an airfoiled fairing over the lower spreader bar added only about an ounce of weight but probably reduced the total airframe drag by a third!

Smaller wheels would also reduce the drag, and wheel pants (on smaller wheels)



*Spoked wheels supplied with the model were replaced by Dave Brown Lite Flight wheels for a weight savings of 3.5 ounces.*

might reduce drag even more, as long as the weight did not increase significantly. Because I fly off a rather rough field, I decided not to go that far, as the pants would probably be damaged rather quickly. I could have reduced weight and drag even more by leaving off the wing struts (they are not required for wing strength), but the model just didn't look right without them. To further reduce drag, I left the vacuum-formed pilot and his "cannon" off the model.

With a little effort, I could have further reduced drag in the wing. The full-span ailerons appear to have been made from 1.5-inch trailing edge (TE) stock; however, the chord of the aileron is reduced to nearly 1 inch at the inboard side where it's cut away from the rear face. The TE is very thick along most of the span. Adding this material back, or substituting a brand-new, full-chord aileron would reduce this "base" drag of the model. Although aileron response was good on this model, this change would certainly have enhanced it.

### THE POWER SYSTEM

I used the Modelair-Tech* H-1000/DeWalt 14.4V power system. It can run on 16 to 21 cells, and it swings 14- to 15-inch props depending on the gear ratio. After initial flights with a 14x8 prop, I thought that the Blue Max could use a slightly larger prop, so I changed to a 15x8.

I installed the drive system on the motor-mount beams provided with the model and cut a large hole into the firewall to provide cooling air into the battery compartment area. Other than that, you install the unit very much as you would any glow engine. I quickly made an ⅛-inch-thick sheet balsa cowl that fits rather snugly over the drive. The cowl "laps" over the fuselage at the firewall and is retained with some clear tape. I added a radiator-like cooling hole in the front of the cowl and put a small piece of plastic window screen behind the hole to keep out foreign objects. Cooling of the motor or battery was never an issue during test flights, and many were made on some rather hot days!

It was time for a quick assessment of the CG. I found that I needed to position the 16-cell battery pack in the bay under the wing (no farther forward) and position the radio system farther aft. I made an ⅛-inch-thick lite-ply "open top" box to trap the 2-pound battery pack, and I secured the box to the floor of the model. I used hook-and-loop fastener in the bottom of the box to prevent the battery from moving forward or aft and, to keep the battery inside the box, I attached a hook-and-loop strap around the box/battery assembly.

### RADIO INSTALLATION

Because of the volume of space consumed by the motor battery pack, I had to move the rudder and elevator servos aft to just forward of the bulkhead at the wing TE. I installed the receiver and its battery just below and aft of the servos and installed the aileron servo as per the instructions.

There is plenty of room in the fuselage under the wing for both the aileron servo and the motor battery. I mounted the ESC to the left-hand inside wall, just under the wing. It is always a good idea to position this expensive piece of model hardware so that it *isn't* in front of the battery (read: freight train), in case the train leaves the station unexpectedly.

### FLYING THE ELECTRIC BLUE MAX

Equipped as stated above, the model was ready to fly at a gross weight of 7 pounds, 2 ounces.

I wasn't nervous about the Blue Max's first flight because, like the old adage in aircraft design, "If it looks right, it will probably fly right!" It did! Right from the first propeller revolution, the model behaved very well. The tail rose very quickly on application of power, though I never felt that it would nose over onto the prop; this is a sign of proper landing-gear placement. Only a little right rudder was required during rollout to keep the model straight. After about a 70- to 80-foot roll, the model lifted off on its own without application of up-elevator, due to its generous wing area and high lift wing. The model flew like a Cub—docile, yet quite aerobatic. Rolls can be hastened with a bit of rudder applied. Loops are "oval," like many scale models. Inverted flight can be held with only a touch of down-elevator. Stall turns are easy with the big rudder. The model spins very nose-down, aiding in a quick recovery. Stalls are gentle and straightforward. Flight times with some aerobatics are around 6 to 7 minutes. I did stretch one very lazy flight to more than 10 minutes with a few touch-and-go's. The Blue Max's sink rate is very manageable with power, and its glide—even with all the drag reduction—is still rather steep. It is best to save some power when you're ready to come home, so that you can stretch the approach and flare the landing.

As kit and ARF manufacturers become sensitive to the emerging electric model-aircraft market, additional "conversion" models like the Blue Max will appear. If you like the classical looks of this model, don't have the time to build and would like to get into "larger" electric models, the Global Blue Max will get you there quickly.

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* ✦

# Make High-Temperature RTV Engine Gaskets

*Quick and easy, without the mess!*

*by John Tanzer*

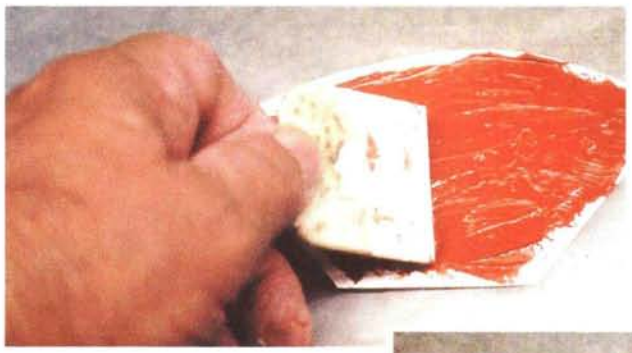

**YOU'LL NEED**

- Wax paper.
- Coffee filter paper.
- Permatex Hi-Temp Silicon.
- Plastic squeegee.
- Roller.
- Piece of plate glass.

The muffler on my Moki 1.8 leaked badly and was getting all gummed up with burnt oil where it attached to the engine. I needed a high-temperature gasket. If you have ever used Hi-Temp silicone sealant straight from the tube, then you know that it can be messy to apply; I was sure there was a better way.

I use Permatex RTV sealant (available from any automotive store) to form a flexible sheet of gasket material that I cut into shape for whichever engine I am working on. I also reinforce the RTV gasket by spreading the sealant over both sides of filter paper. When it cures between the sheets of wax paper, the material is very strong and doesn't tear easily. Using this technique, you can make gaskets for crankcase backplates, mufflers and carburetors. The material is safe to use on glow and gasoline engines. If you need a thicker gasket, use two layers of filter paper and spread Permatex in between the layers as well as on both outer sides.

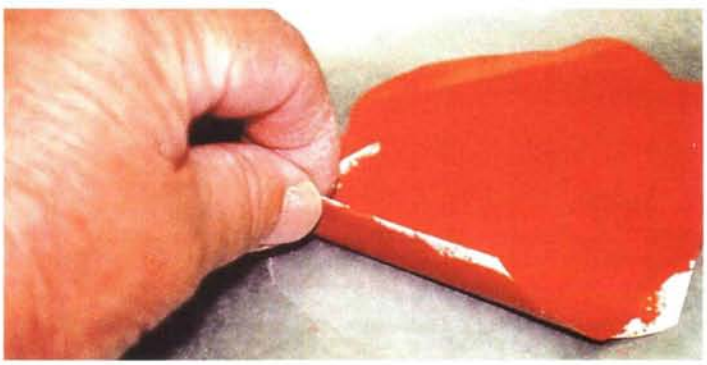
Give it a try; I think you will like it.



**2** Use a plastic squeegee to spread the Permatex over the entire piece of filter paper; then flip the paper over and apply more silicone to the other side of the paper.

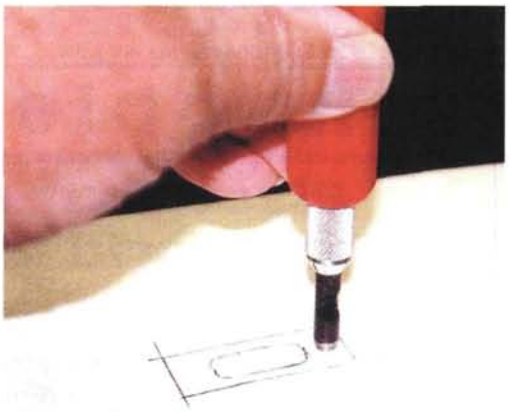
**3** Place another piece of wax paper over the silicone coated paper and roll the silicone smooth; this forces the Permatex into the filter material.

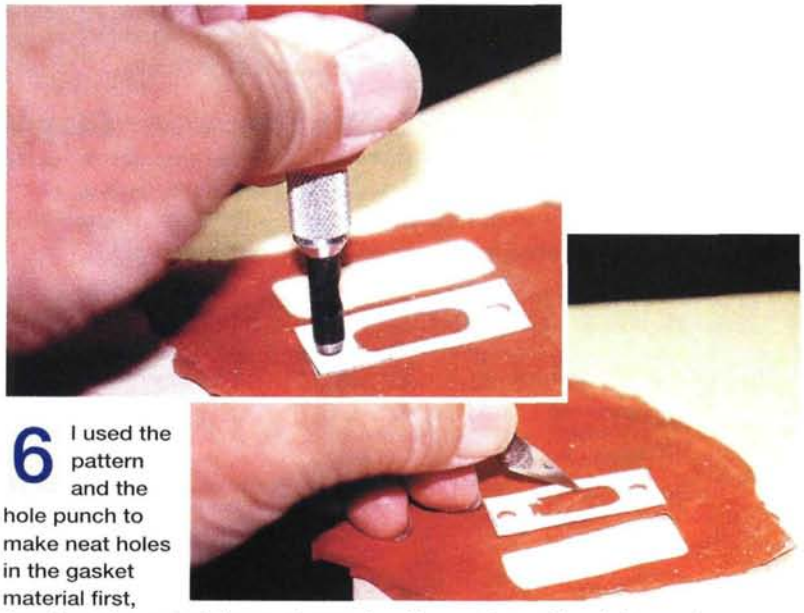
**1** Place a sheet of wax paper over the glass plate. Place the filter paper on top of the wax paper and apply a coat of Hi-Temp silicone on top of the filter paper. The filter paper will act as reinforcement fibers and will strengthen the finished gasket.

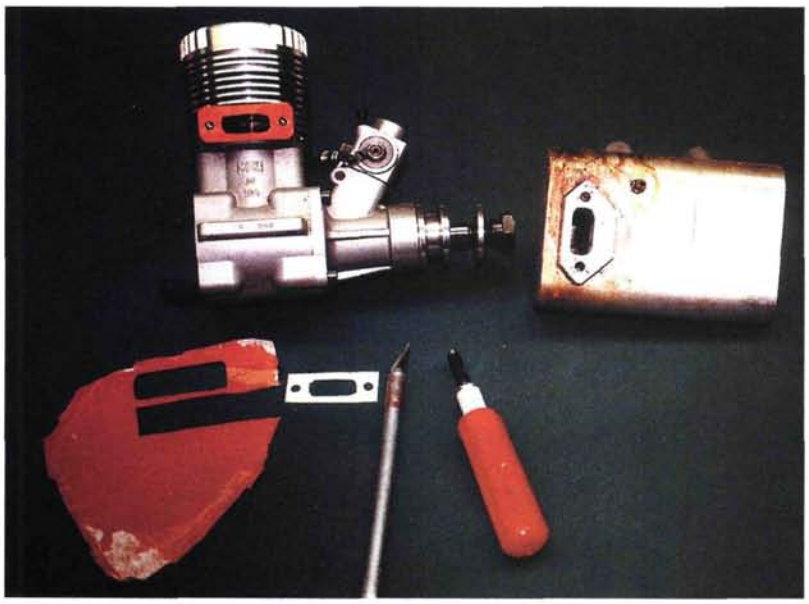
**4** When the Permatex has cured, remove the top piece of wax paper from the gasket, then peel the gasket off the other piece of wax paper.

**5** Here, I am making a card-stock pattern. I made the bolt holes with a hole punch; the rest I cut out with a razor knife.





**6** I used the pattern and the hole punch to make neat holes in the gasket material first, then I cut the rest of the gasket to size. Use a piece of hard plywood as a backing block while you cut out the gasket.



**7** Here you see the gasket in place ready for the muffler to be bolted on. These gaskets work very well, last a long time and are very strong. ✦

# LATERALLY CHALLENGED

## *Experimenting with single-aileron control*

*by Roy L. Clough Jr.*

After I bashed Chip Richards' Wizard Biplane and renamed it "Edgebird" (see *Model Airplane News*, May 1999), I flew its transparent, side-lifting wing curtains into the land of hubris. I'd roll it up knife-edge for anybody who'd look at it.

One busy Sunday, after showing off my expertise at our flying site, I was 100 feet up, just starting a roll, when a Trainaire suddenly roared out of nowhere under the full impetus of a well-tuned O.S. .46FS.


***Edgebird before its demise. It had transparent plastic wing "struts" that allowed it to knife-edge with ease.***

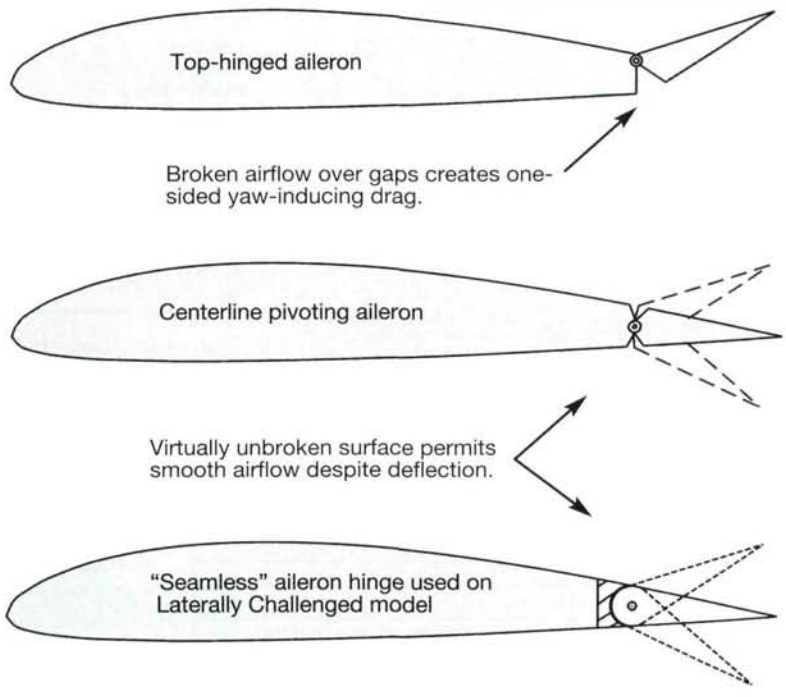
***Laterally Challenged rose from the ashes with only one aileron; it performs as well as two-aileron models.***

It was a collision connoisseur's delight. I mean, isn't there some wonderfully macabre satisfaction in a spectacular midair? This one was a virtual explosion of balsa and MonoKote. Parts and pieces rained down over half an acre.

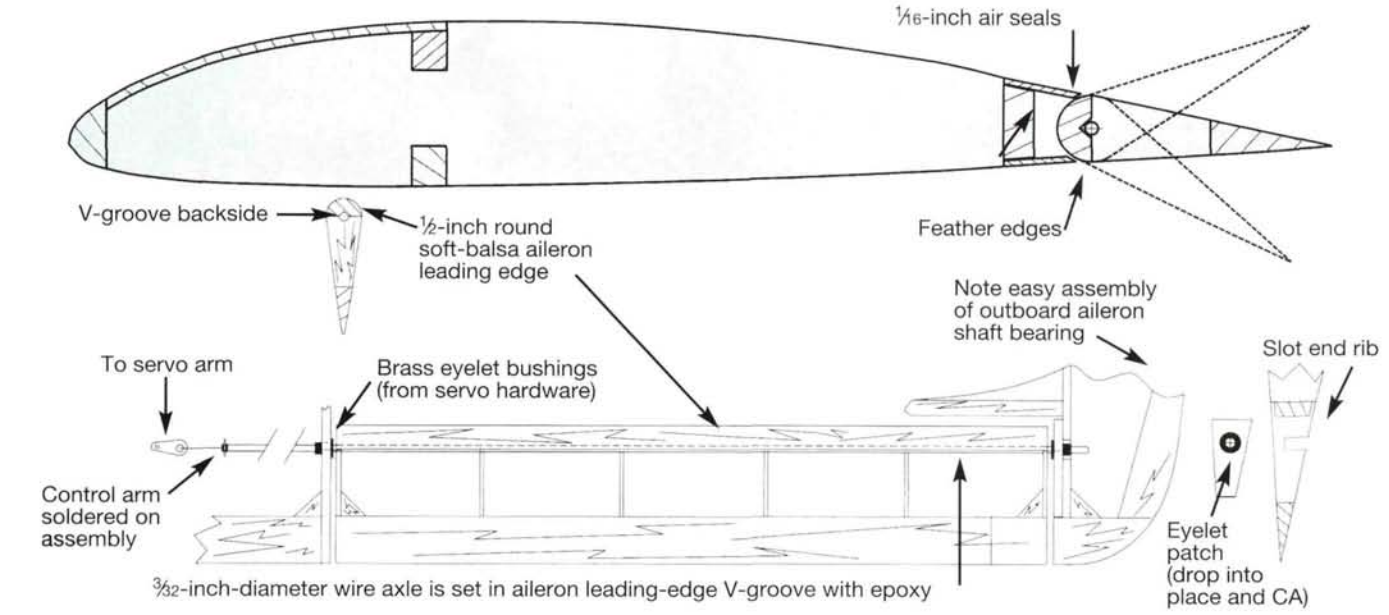
Poking through my half of the debris, I realized my agile biplane had been converted into two-thirds of a monoplane kit. The lower wing and ailerons and a third of the top wing were gonzo. The engine had been torn out of the fuselage, the wheels splayed north and south, and the fuel tank had ruptured. Still, the disaster wasn't total: the radio was unharmed, and the tail assembly and fuselage were virtually intact. So there were possibilities—provided I could uncurl the landing-gear legs. Well, why not try? I strewed the remains across the back of the bench and worked on it at odd moments. One day, at last, it needed only a wing to fly again.

The remaining two-thirds of Edgebird's top wing was in pretty fair shape, but the ailerons had been in the trashed bottom wing. When I rebuilt the right side of the wing, it would not be a problem to relocate a couple of spars to accommodate an aileron, but cutting in a left-side aileron would mean major rework. Worse, it would begin with tearing off a beautiful, drum-tight covering job.

Sloth is the mother of simplification. I decided to discover how well my salvaged mid-wing would fly with one aileron. To give it every chance, I installed my single aileron to deflect top and bottom without opening the drag-inducing gap that would



**CLOUGH'S "SEAMLESS" AILERON CONSTRUCTION AS USED ON LATERALLY CHALLENGED**




induce yawing. I decided to call my new creation, "Laterally Challenged."

While the glue was drying, I mentally hedged my bet by dreaming up cute fixes that might be needed (like a delayed rudder linkage) but decided to fly the model first. I was surprised to discover I could see no appreciable difference between it and a two-aileron ship; neither could a couple of friends who flew it. The sealed aileron hinge probably helps a lot, but I suspect other factors, such as mid-wing symmetry and large tail surfaces, damp any vestigial yaw. One wit suggested that if I ironed on a patch of red MonoKote to simulate an aileron on the left side, nobody would know the difference. I've made many consecutive landings without breaking anything, and those who have flown the model tell me that they would never have guessed it has one aileron if they hadn't seen it on the ground. ✦

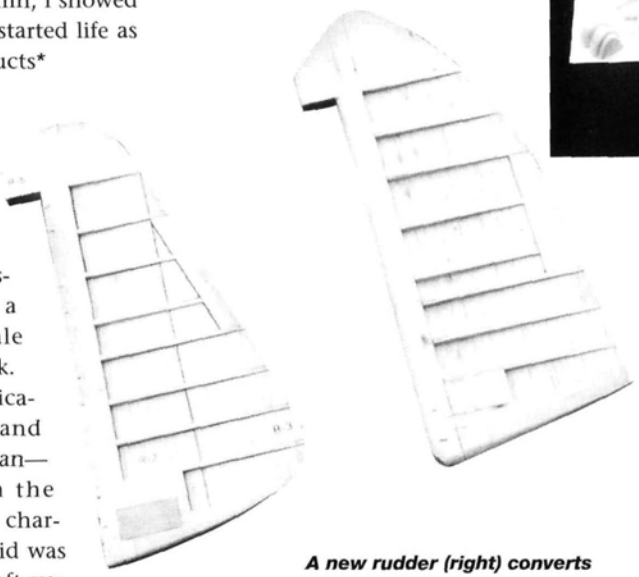
 by George Leu

# Detailing the Midwest Texan

Rich Uravitch sells the vacuum-formed plastic Cosmetikit and fiberglass parts that can improve the scale look of the Midwest Texan.

In my December 2000 column, I showed a photo of my SNJ-2 that started life as a modified Midwest Products* AT-6 Texan kit. The amount of mail I received asking for more details on the modification persuaded me to devote this month's column to showing how I did the little things that transformed this excellent kit into a unique and interesting scale project. Let's take a closer look.

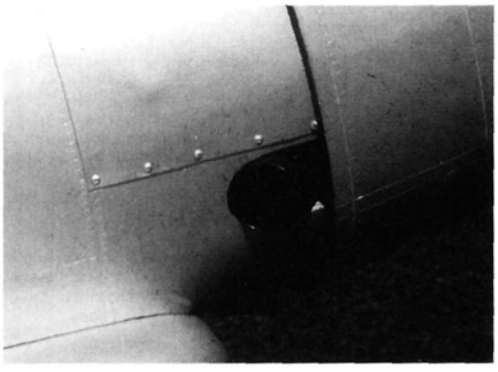
I made only a few modifications to capture the spirit and feel of this version of the Texan—the SNJ-2—and yet retain the original model's good flight characteristics. The first thing I did was research the particular aircraft version I wanted to replicate. In the Squadron/Signal* T-6 Texan "In Action" book, I found a 3-view to use as a guide. The SNJ-2 differs from the later model AT-6 because it has rounded wingtips and a differently shaped rudder. These minor changes make all the difference to the model's look. I also thought that a slightly larger wingspan and more rudder area wouldn't adversely affect the model's flying characteristics; I thought, if anything, these changes would help.



A new rudder (right) converts my Midwest AT-6 Texan into an SNJ-2. I built the new rudder using the same balsa construction as the original had.

Here's the cockpit before the canopy was glued into place. Note the recessed area around the cockpit opening. This allows the canopy to sit flush with the fuselage's outer skin.

The cockpit tub's depth was determined by my pilot figure's height. You don't want his head to touch the canopy.



The large panel behind the engine cowl is a piece of lithoplate sheet I screwed and glued into place. Note the scale exhaust pipe.

To improve the model's general appearance, I used a Cosmetikit from Rich Uravitch*. This aftermarket package contains several vacuum-formed parts, including two instrument panels with gauge faces, an instrument-panel hood, two air/oil-cooler scoops, two dihedral joint fairings, one set of clear, landing-light covers, one set of navigation and position light lenses, a dummy radial engine face and a tailwheel strut cover. I also ordered a replacement fiberglass engine cowl and a wheel-well pan for the center wing section.

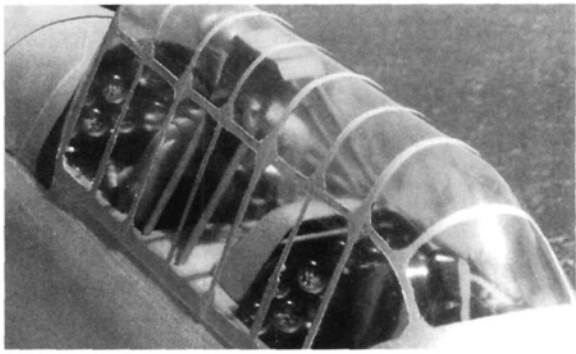
I decided to add a recessed, detailed cockpit area with a flat floor and detailed parts so that there would be something to look at under that big, impressive "greenhouse" canopy. If you want to impress people, you must have a three-dimensional cockpit.

In the June 1996 issue, editor Gerry Yarrish published an excellent article on how to make a simple yet impressive cockpit "tub" for the AT-6 Texan model. I used his technique, and as you can see, it adds much to the finished model. Recessing the stock cockpit floor adds depth to the interior, and even though it isn't a scale depth, it's better than just a flat plate interior with a couple of pilot busts glued to it. The ⅙-scale pilot in my Texan is from Great Planes*.

First, I cut away the two cockpit areas, and then I built the tubs for each with a depth of about 1¼ inches. I determined the depth by taking into account how high I wanted my pilot to sit in the model. I didn't want his head hitting the top of the canopy, and he fit properly after a little trial and error. I then built a simple aluminum tube, dowel and ply wood roll-bar structure that fits behind the front and rear tub. I used leftover plastic parts from other cockpit kits, some wire, the Cosmetikit instrumen panels, dials, etc., until I had the inside appearance that I wanted. Although i

***The white portion of the dihedral fairing around the wing's LE is vacuum-formed, and the rest of it is made of balsa. A little filler and some sanding blends it into the wing.***

***After the model has been painted, the dihedral fairing looks great and adds character to the Texan model.***



***When they're finished and painted, the canopy and the cockpit interior add much realism to the model.***

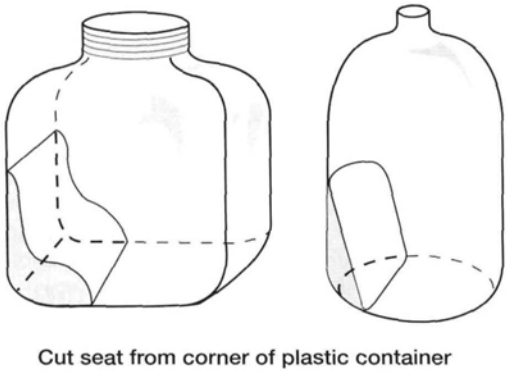
isn't 100 percent true to scale, the end result is very pleasing to look at.

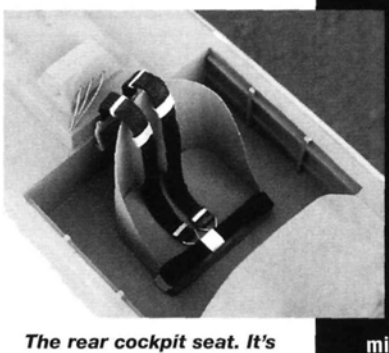
### EXTERIOR DETAILS

I used my 3-view documentation as a guide to position the landing lights and air/oil intake scoops. Dressing up the wing dihedral joint is the very obvious joint fairing. I think this detail makes the wing look great.

Changing the rudder and wingtip outlines requires little effort. I cut larger balsa tip blocks to the new shape and sanded them to match the airfoil. I built a new rudder using the same balsa structure as the stock one has and covered it with fabric. At the fuselage's front, just behind the engine cowl, a lithoplate sheet duplicates the raised panel typically found on full-size aircraft. I routed the model engine exhaust pipe through a scale exhaust pipe. For the final touch, instead of simply screwing and gluing the canopy to the top of the fuselage, I recessed it into the model so that it was flush with the outer skin. A little filler here and there and some sanding, and the job is finished. I added rivet details and simple panel lines and then painted the model with yellow and silver Cheveron* Perfect Paint.

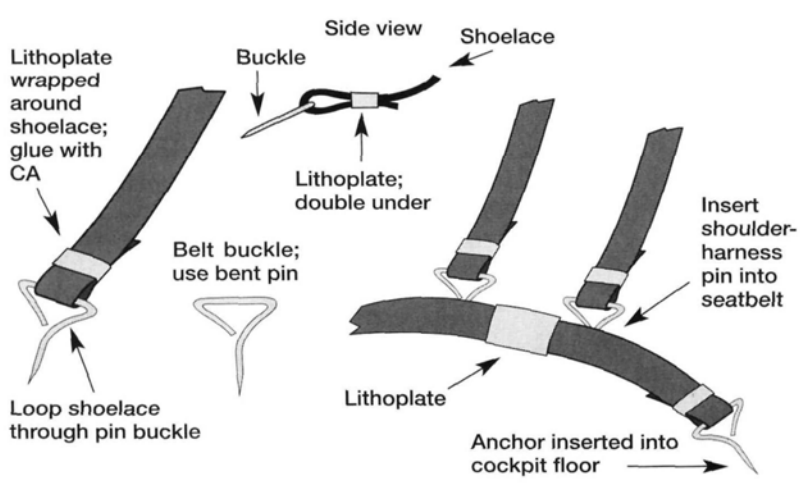
That's it for the modifications; I didn't want to do anything too severe that might have upset the model's flying qualities. As a final note, with all of its modifications, the model weighs 12½ pounds, ready to fly. If you decide to do something similar to a model you're working on, send me a photo when you've finished.



***The rear cockpit seat. It's made from a rounded section of a plastic container. The seatbelts and shoulder harnesses are made from shoelaces.***

**Seatbelt/shoulder harness detail**




## SCALE TECHNIQUE OF THE MONTH

**While I'm on the subject of cockpit detailing, I thought I'd show you my technique for making the seats in my SNJ-2. The seats, seatbelts and shoulder harnesses are a focal point for any scale cockpit interior. Everyone wants to see the pilot's "front office." Typical WW II aircraft had aluminum bucket seats that were shaped so that the pilots' parachute packs could act as seat cushions. I created my model's seats out of products found around the house. I used the rounded section of a plastic container as a bucket seat. I drew its shape on the container and cut it out with scissors, such as those that RC car builders use to cut out Lexan bodies. You can add a beaded edge around your new "seat" by splitting a piece of thin fuel tubing and gluing it into place with CA. Make a suitable frame for the seat, or simply glue it to the cockpit floor and paint it the appropriate color.**

**I made the seatbelts and shoulder harnesses from flat shoelaces. I trimmed them to length and added pieces of lithoplate (0.005-inch thick) to simulate the buckles. The connecting hooks are formed from bent pins. That's it for this month. I hope you'll try these techniques on your next scale model; you'll love the results.**

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.*

 by Don Edberg

# Programmable mixers

This month's column will focus on one of the handiest—and most commonly misunderstood—features of computer radios: mixing (or programmable mixing). Mixers come as standard equipment on many of today's computer radios, but they often aren't used. Why not? A lot of folks don't know what to use them for! In this column, I'll show you how to use them to make flying your models better and more fun by compensating for pitch and roll tendencies during knife-edge flight. But first, let's go over a few definitions and explanations.

### WHAT IS A PROGRAMMABLE MIXER?

Let's start with the definition of a mixer. A mixer is something that makes a control input device on the transmitter affect the response of a normally unrelated channel on the receiver (in addition, of course, to the function that it's supposed to control!). Depending on the type of radio, the mixer can be made to respond to one of the control sticks, a toggle switch, a rotary knob, or a sliding lever. Mixers are commonly used to:

1. Correct the flight characteristics of models that don't behave properly, such as those that are warped or misaligned or have layouts that affect their flying qualities.
2. "Build your own" functions to make your models do what you want them to do.

For example, Property 1 is used to automatically add correcting aileron or elevator motion to get rid of unwanted rolling and pitching during knife-edge flight. Another example would be to apply rudder to correct for an engine thrust line that's off. In this column, we're going to concentrate on Property 1.

Property 2 could be employed to create a second throttle control for a twin or to make preset drop positions for wing flaps. Of course, there are unlimited uses for both properties.

Note that many computer radios—particularly the high-end models—have built-in functions to do some of these things. It's difficult, however, to design a system that will do all the things that everyone might want, so the designers provide us with programmable mixers to accommodate all of the functions that they could not anticipate.

### HOW DOES A MIXER WORK?

For those who aren't familiar with the principle of mixing from one function to another, I like to use the analogy of a car

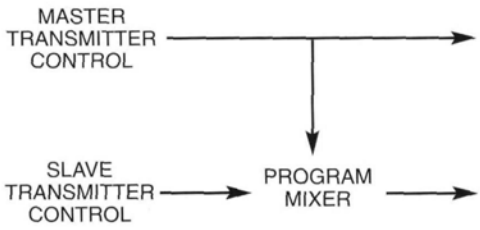



***Figure 1. A programmable mixer takes inputs from the master channel and adds, or mixes, the inputs with those coming from the slave's controlling channel. So, the master receiver responds only to the master control, but the slave channel responds to both the slave control and the master control.***

### TABLE 1. STEPS NEEDED TO SET UP A PROGRAMMABLE MIXER

**ACTION** Fly your model and note which direction you have to hold the ailerons.

**RESULT** You know which direction to set up the mixing to occur with rudder.

**ACTION** Choose an unused PMIX circuit. Press the button needed to activate it.

**RESULT** The word "on" or "active" will appear (instead of "inh" which means "inhibited").

**ACTION** Press the button to get to the master channel selection, then use the keys to enter the master channel (= rudder).

**RESULT** The system will indicate the master channel with an arrow or alphabetic designation.

**ACTION** Press the button to get to the slave channel selection, then use the keys to enter the slave channel (= aileron).

**RESULT** The system will indicate the slave channel with an arrow or alphabetic designation.

**ACTION** Press the key to get to the mixing rate specification.

**RESULT** This will take you to a screen where there will be a percentage number flashing.

**ACTION** Press the (+) or (–) keys to input a small amount of mixing (say, 15%).

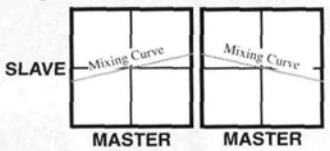
**RESULT** This selects the amount of mixing for one side of rudder travel. If your radio displays the curve on a graph, note that the slope of the curve changes with the selected percentage. The larger the number, the steeper the slope.

**ACTION** Move the rudder stick all the way to the side, and verify that the ailerons move in the correct direction at the same time.

**RESULT** If the ailerons don't move, go the opposite direction with the rudder. If they move in the wrong direction, change the sign of the mixing, i.e., change "+" to "–" or vice versa.

**ACTION** Slowly move the rudder stick back and forth until 0% appears. Now hold it there and use the (+) or (–) keys to input the mixing for the other side. It may have the opposite slope depending on what is needed for your model.

**RESULT** This sets the amount of mixing for the second side of rudder stick. If your radio displays mixing curves, you will end up with something like this:




**ACTION** If your radio allows you to switch mixers on and off, press the key to get to the switch select screen.

**RESULT** Enters the switch select menu. You want to be able to shut off the mixer in case you chose too much mixing. You can make it permanent later.

**ACTION** Use the keys to select the desired switch and "on" direction.

**RESULT** You can now turn this mixer on and off with a toggle switch on your radio.

**ACTION** Fly the model and pay attention to how much aileron you need to hold in knife-edge fo both sides of rudder.

**RESULT** You can then adjust the percentage values for mixing on each rudder side until you no longer have to hold aileron.

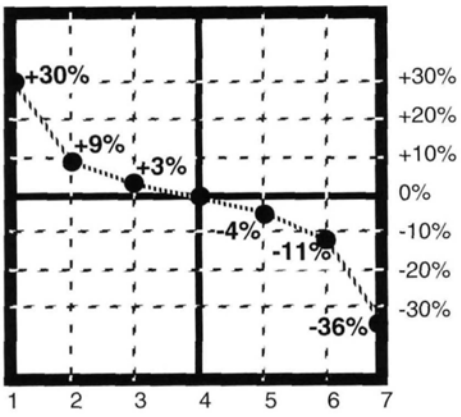



***Figure 2. A curve-type programmable mixer allows you to "customize" the mixing curve to get just the response that you need. This figure shows a seven-point curve. The more expensive RC systems have this option.***

with brakes that are badly in need of adjustment. The brakes cause the car to "pull" to one side, so when you press the brake pedal, you have to turn the steering wheel at the same time to keep the car going straight. The steering you apply compensates for the brakes' pulling to one side.

If the car was an RC model, you could simply turn on a mixer and mix from brake to steering. That is, whenever you applied the model's brakes, the radio would automatically apply steering in the way you told it to so that it would continue driving in a straight line. So, we can make the following definitions for this example: the master control—brakes—causes the action to happen. The slave control—steering—moves because of the programmable mixer. This concept is illustrated in Figure 1. Now, let's look at an airplane example.

### FIX UNWANTED ROLLING DURING KNIFE-EDGE

Knife-edge flight occurs when you roll the model 90 degrees to one side or the other and hold lots of rudder to keep it flying more or less horizontal. You need a model with lots of power to accomplish this. Ideally, the plane will just cruise along sideways for as long as you hold a lot of rudder.

In reality, it doesn't usually work this way. Your model may roll during knife-edge flight, forcing you to hold a bit of aileron stick in addition to a lot of rudder. The unwanted rolling is caused by a bunch of factors, including the position of the fin and rudder on the fuselage, the thrust angle, stabilizer/elevator position, airspeed and more ... too complex to go into here. Depending on its geometry, the model may roll the same way as the rudder is applied, i.e., with full left rudder, it will roll to the left, but it may also do the opposite. If that's not enough, because of the direction of rotation of the propeller, the amount of aileron needed may vary depending on which side the model is flying! Models respond differently, and you have to find what you need by trial and error during test flying.

***The JR 10X has a touch screen to adjust several of the radio's features. Here, you see the rudder/aileron/elevator mix menu.***

Having to hold the aileron stick a bit is uncomfortable, not to mention that it's difficult to consistently hold just the right amount. Solving this problem is a perfect use of a programmable mixer. We will set up the mixer so that you won't have to worry about inputting the right amount of aileron during knife-edge flight with lots of rudder; it will happen automatically.

You will do this by setting up a mixer to mix rudder into ailerons. In this case, the master control is rudder, and the slave control is aileron. This is usually illustrated in the abbreviated form: RUD —> AIL; the direction of the arrow indicates the master and slave controls.

The instructions for setting up mixing depend on the make and model of radio, but they generally follow the steps given in Table 1. Note that I will abbreviate programmable mixer as "PMIX" from here on.

You usually have to input separate mixing values for each side of the control function. If you forget, mixing will occur only on one side of knife-edge! I recommend that you start with smaller values and work up to larger ones so you aren't surprised the first time! (Note that the percentages given here are examples; you'll need to determine your model's actual needs by trial-and-error flight tests, in which you continue to adjust the percentages until the model flies just the way you want it to.)

The amount of roll coupling that occurs during knife-edge is usually not linear, meaning it doesn't respond evenly to the rudder angle. For example, at ⅓ rudder travel, you may need only 2 percent roll coupling. At ⅔ travel, about 8 to 10 percent coupling is needed. At full travel, much more mixing is needed, perhaps 30 percent roll coupling. Is there a way to do this on a PMIX? Yes; read on!

### USING A CURVE MIXER

Fixing a problem of this type is an ideal use for the "curve-type" programmable mixer (curve mixer) found in more expensive radios, such as the Futaba 8U and 9Z, JR 8103 and 10X series. A curve mix allows you to specify more than just the endpoints on the mixing curve; you can make the mixer obey any curve that you can program into the radio. Setting up a curve for mixing is like "connecting the dots," and you can move the dots all over the place.

The number of dots defines how the curve can look. You can raise and lower the dots in any way you want, but you generally want a fairly smooth curve. In the case of the roll coupling I mentioned earlier, you would want a curve that looks like the one in Figure 2.

Notice that you can independently specify the position of each of the curve points. With this freedom it's possible to make a curve that will do exactly what you want. In fact, if you carefully study Figure 2, you'll see that one side has a little more mixing than the other to account for differences in the plane's response to each side of rudder. You can also see that the mixing is reduced for intermediate amounts of rudder stick.

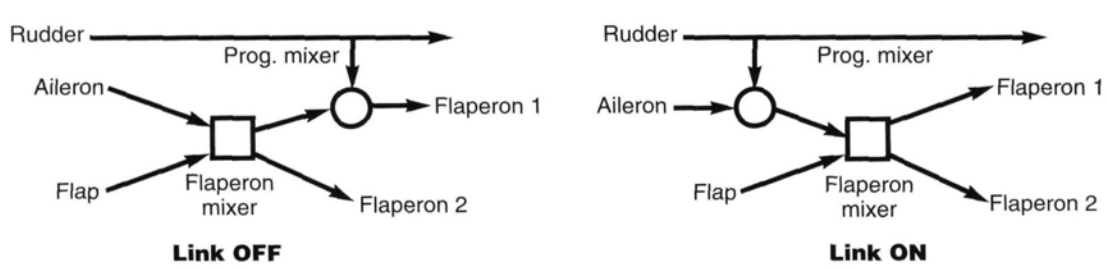



***Figure 3. On some radios, you need to turn on the "link" function to get the mixer to work properly with both aileron servos if you have flaperon or differential function activated. Otherwise, the mixing goes only to one servo and not to the desired two servos.***

### USING THE TRIM AND OFFSET FUNCTIONS

The trim function on some PMIXs allows you to decide whether the master channel's trim lever will affect the slave channel. In most cases, including the knife-edge example we've examined, you do not want the master channel's trim to affect the slave channel. Otherwise, every time you change the rudder trim, you would add some aileron trim, too.

Another feature on some PMIXs is called "offset." Offset allows you to move the zero point of the mixing curve away from the center of the mixing chart. We don't want to do that for our knife-edge example because we don't need compensation when the rudder is centered. Offset values are mainly used with master channels that don't center, such as throttle or a knob or lever.

### USING THE LINK FUNCTION

Many models have two aileron servos—one individual servo for each aileron. This requires a second receiver output, which is usually activated when the flaperon (combined flaps and ailerons) function is turned on. Differential also activates a second aileron servo. If either of these functions is active, our scheme for mixing into the ailerons may not work properly with some radio systems, such as Futaba's. When the mixer is activated, the system may not feed the mixing signals to the second aileron servo unless we use a special setting within the mixer programming.

This setting is called the "link" function. Link allows the program mixer to address both the aileron servos if you have a function such as differential or flaperon turned on. You don't need to use the link option if you have only a single aileron servo.

Mixing with and without the link function is shown in Figure 3. Notice that only one aileron servo receives the mixing when the link is off, since the mixing signal comes in downstream of the mixer (left side of Figure 3). The link function properly puts it upstream (right side of Figure 3).

### KNIFE-EDGE AND PITCHING

So far, we've talked only about roll induced by rudder, but depending on the model design, you can also program in some pitch corrections. Unlike the roll problem, however, most planes want to "tuck" (pitch downward) when a lot of rudder is applied, so you want the PMIX to provide up-elevator when the rudder is commanded to either side. This type of mixing is shown in Figure 4. Note that the mixer provides the same direction of elevator compensation regardless of the rudder direction. Note also that the amount of compensation is likely to be slightly different on each side, and it is geometry- and airspeed-dependent, as was the rolling compensation shown earlier.

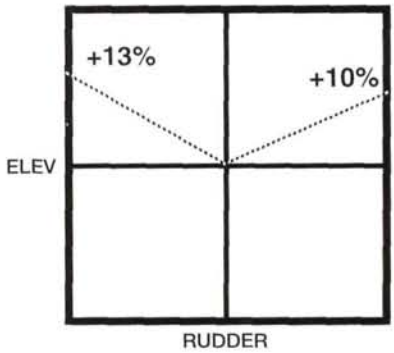



***Figure 4. This is the curve that you might use for elevator compensation during knife-edge flight. Note that the elevator command is the same direction regardless of the rudder (master) stick deflection.***

Well, I have run out of space for this month. I hope you found this exposé of programmable mixers helpful! Remember, if you want to write to me, send an SASE c/o *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA, or email man@airage.com. I get lots of mail, so please be patient!

# PRODUCT WATCH

*Latest product releases*

**AT *MODEL AIRPLANE NEWS*, we not only tell you what's new, but we try it out first to bring you mini-reviews of the stuff we like best. We're constantly being sent the latest support equipment manufacturers have to offer. If we think a product is good—something special that will make your modeling experiences a little easier or just plain more fun—we'll let you know here. From retracts and hinges to glow starters and videotapes, look for it in "Product Watch."**

ACE HOBBY DISTRIBUTORS INC.

## Super Digipulse Multi-Charger

### Six chargers in one!


The average RC'er deals with several types of batteries of various sizes and capacities. These include the single-cell glow-plug lighter, the receiver battery, the transmitter battery and, in some cases, drive batteries for electric flyers. The Ace Super Digipulse Multi-Charger is intended to handle the charging requirements of all of these. This neat device provides six totally independent outputs, each of which is easily programmable, provides a charge rate from 10 to 150mA and handles packs from one to 10 cells. Each output automatically switches to a safe trickle rate at the end of a 16-hour overnight charge. It can also display the number of hours left in the charge period for any of the six outputs. And, you can start the charging sequence for different batteries at different times. In essence, the Digipulse is six different programmable-rate, auto-trickle chargers in one!

How does it work? The Ace Digipulse consists of six separate circuits that produce a fixed-current rate of 150mA. An onboard, microprocessor-based controller switches this current on and off (i.e., pulses it) to provide the proper amount of energy to each of the six outputs to charge the various batteries. The duration of the pulse is controlled by the computer that is at the heart of the Digipulse. For example: if 150mA of current is pulsed so that it is "on" only ⅓ of the time, the effective current is 50mA. The microprocessor regulates the duration of the pulse to match the current requirement. Ace has done all the hard work and has made operating the Digipulse as simple as pressing a couple of buttons.

A 24V AC power supply is included, but you have to provide the necessary cables and connectors to accommodate your particular radio system. The Digipulse has rack-type handles that allow the unit to rest horizontal or vertical on your benchtop or shelf, or be stacked with other Ace products that have the same type of handles. The street price for the Ace Super Digipulse Multi-Charger is about $95, and it will make a very useful addition to any RC'er's workshop. —*Jim Onorato*

**Ace Hobby Distributors**, 116 W. 19th St., Higginsville, MO 64037-0472; (660) 584-7121; fax (660) 584-7766; www.acehobby.com.

DYMOND MODELSPORT USA

## DC/DC FET Quick Charger

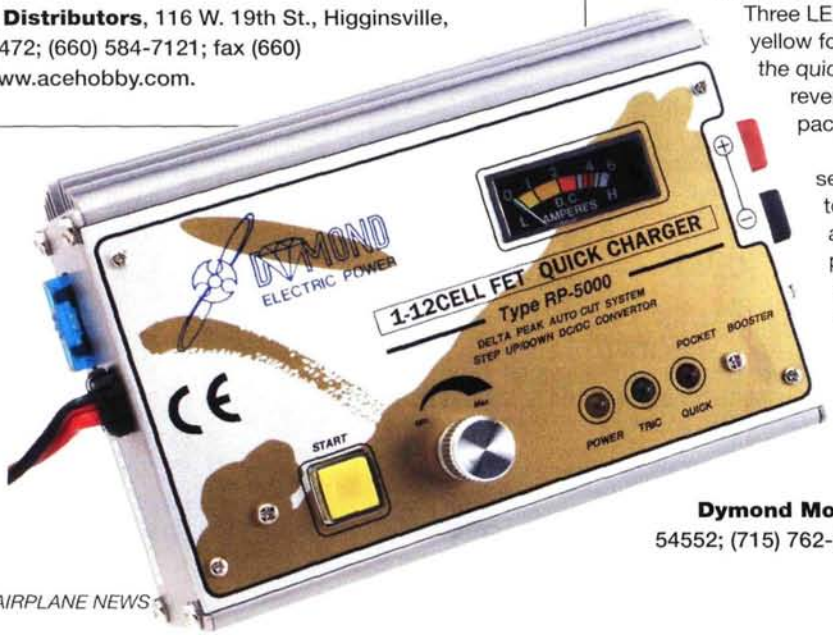
### A gem of a charger

The FET Quick Charger from Dymond uses delta-peak technology to peak-charge 1- to 12-cell Ni-Cd or NM-Hd packs. The charge current is adjustable from 0.5 to 4.2 amps, and there is an amp meter on the face of the charger to check the charge setting. The charger has a 36-inch-long voltage-input lead, two spring-loaded output terminals (positive and negative) and a small fitting for charging a 1.2V single-cell glow-plug-driver battery.

To operate the FET Quick Charger, simply attach the input leads to your 12V battery or power supply and connect the battery pack you want to charge to the output terminals (you must supply your own charge leads). Push the start button, then adjust the current by turning the single adjustment knob. Three LED lamps indicate the modes of the charger: yellow for power on, green for trickle charge and red for the quick-charge mode. The charger automatically reverts to the trickle-charge mode after the battery pack has peaked.

I have used the Dymond Quick Charger all season, and I very much like how it works. I use it to charge radio (receiver and transmitter) packs as well as drive packs for electric-powered models. I have charged packs as small as 300mAh (1 amp) to 2000mAh (3 amps) with no worries; just plug them in and forget them.

A reasonably priced ($79.95) and easy-to-use field charger, the Dymond FET 1- to 12-cell Quick Charger is a good addition to anyone's field equipment. I'm sure you'll like it. —*Gerry Yarrish*

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OTT-LITE TECHNOLOGY

## True Color Lamps

### See the light

Light is something we take for granted in the workshop—and pretty much everywhere else, too. Fortunately for us, Ott-Lite doesn't, and its attention to the subject has resulted in the excellent line of True Color lamps. These lamps simulate daylight, producing balanced colors and reducing glare, which eases eyestrain. This makes for a brighter, healthier workspace and allows you to work more easily and comfortably over longer periods of time. The difference is really noticeable! A couple of these lamps are in use around the *Model Airplane News* office, and everyone loves them. Everything looks crisper under these lights, and at the end of the day, our eyes are much less tired.

The lamps come in various sizes and styles, ranging from small desktop types to free-standing floor models. Of particular interest to modelers is the optional magnification feature. The True Color Magnifier Lamp (see photo) is a foldable desktop unit that incorporates a clever flip-down magnifying lens. The 2x magnification makes intricate detail work much easier and produces cleaner, neater results. On the larger lamps, such as the True Color Flex-Arm Plus (also pictured) and the floor lamp, an optical-quality 3x magnifier accessory is available. It clamps onto the lamp with an adjustable extension arm for perfect positioning. The excellent illumination combined with clear magnification makes modeling detail work a cinch—no more squinting!

The Magnifier desk lamp features a built-in swivel base, and the Flex-Arm Plus comes with both clamp-on and free-standing bases. All units are rated at 10,000 hours of bulb life. The basic desktop lamp costs $62, and the version with the built-in magnifier costs $100. The Flex-Arm Plus and the floor lamp each cost $133, and the magnifier attachment for them costs $89. —*Matt Boyd*




**Ott-Lite Technology**, 1214 W. Cass St., Tampa, FL 33606; (800) 842-8848.

MIDWEST PRODUCTS CO. INC.

## Sup-r Sander

### The last sander you'll ever need

Midwest has come out with a great new product to replace all that sandpaper you have lying around your workshop. The Sup-r Sander system is a reusable sanding surface mounted to a sturdy plastic handle. The sanding surface is made of tungsten carbide (the same material as used on saw blades and router bits), so it won't tear or wear out, and the handle is comfortably shaped so using it won't wear *you* out!


This durable sanding tool can be used on almost any surface: all types of wood, metal, plastic, foam, fiberglass, drywall, tile and brick. If the sanding surface gets clogged, simply dust it off with the included wire brush. The handle doubles as a carrying case for the brush, so you don't have to worry about losing it.

I like the design of these sanders; they fit comfortably in my hand, and the curvature of the handle gives a secure grip at a variety of angles. The handle on my fine-grit sander allowed the wire brush to rattle around a little inside, but that minor annoyance was easily fixed with a piece of tape. Other than that, they work like a charm.

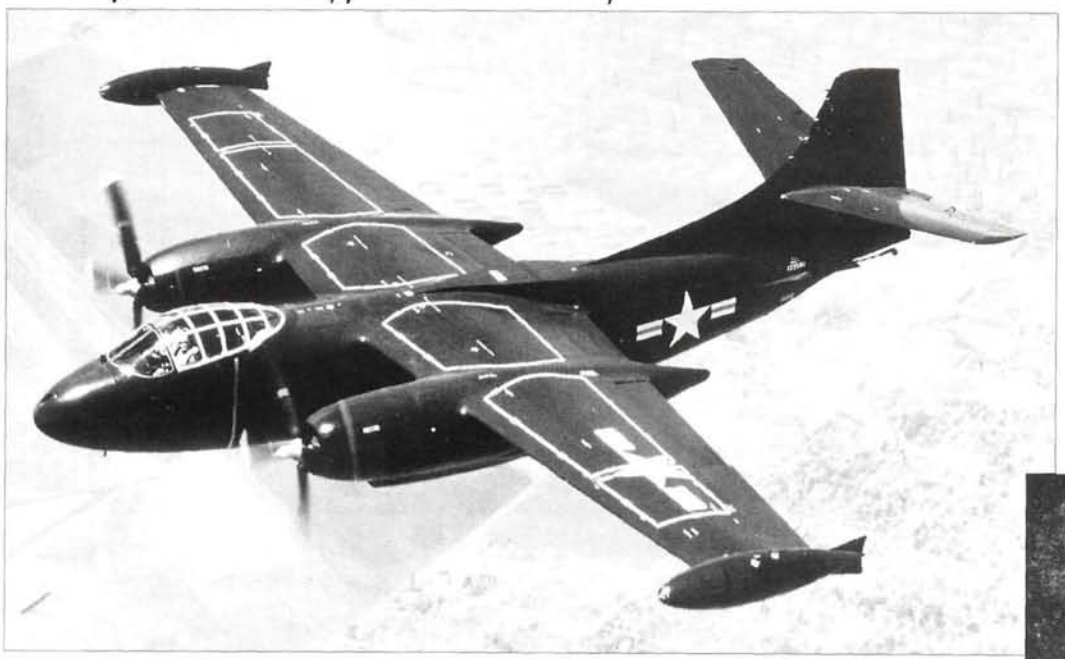
The Sup-r Sander comes in three grits—fine, medium and coarse—with color-coded handles for easy identification. The suggested retail price for each unit is $12.99. That's a bargain, since you'll never have to buy sandpaper again! —*Matt Boyd*

**Midwest Products Co. Inc.,** 400 S. Indiana St., P.O. Box 564, Hobart, IN 46342; (219) 942-1134; fax (219) 942-5703.

# NAME THAT PLANE

*Can you identify this aircraft?*

**Send your answer** to *Model Airplane News*, **Name that Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606 USA.



Congratulations to Ted Andrews of Langley, WA, for correctly identifying the December 2000 mystery plane as the Henschel Hs-125b; Ted wins this month's one-year subscription to *Model Airplane News*. The Hs-125b is an advanced trainer that was developed in the mid-1930s by Henschel Flugzeugwerke A.G.; it used the Argus AS 10C 240hp inverted-V, 8-cylinder, air-cooled engine. The "D-EKAN" wing markings identify this as the second prototype. ✦


The winner will be chosen, four weeks following publication, from correct answers received (delivered by U.S. mail) and will be awarded a free, one-year subscription to *Model Airplane News*. If already a subscriber, the winner will be given a free, one-year subscription extension.

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BY GUY REVEL

# Giant Westland flying wing

When Eric van den Hoogen started looking for a new project to follow his world-record-setting Horten XII giant electric flying-wing model, his friend Aad van Sorgen suggested the Westland-Hill Pterodactyl, an unusual British flying wing from 1931. To their knowledge, the Pterodactyl had never been modeled in scale, and it presented several technical challenges—not the least of which was reproducing the full-size plane's adjustable sweep wing. Eric and Aad decided to build the three-seat research aircraft in ⅓ scale, yielding a 177-inch wingspan, which surpassed the previous record set by the Horten XII. They again chose electric power, so the weight had to be kept below 20kg (44 pounds), as dictated by Dutch regulations.

*The Pterodactyl ready for takeoff. This model is a real crowd-pleaser wherever it goes.*

Because of the model's size, Eric chose the Plettenberg Dino 500-50 8-turn motor for power. This motor has a double set of commutators that allows two separate batteries to be used, each connected to a different brush set. The Dino is one of the most powerful electric motors available; with 3,500 watts of power, it provides more than 3bhp at the propeller! The motor drives a carefully reproduced, 14x10-inch scale propeller at 5,200rpm.

*The variable sweep wing mechanism allows the pilot to alter the balance point in flight. The result is an exceptionally stable airplane that flies like a sport model.*

The model's structure is balsa, with plywood reinforcements. The wing is built like any standard model's, except for the two large spruce spars that hold the attachment points. The front spar is for the variable sweep mechanism. The other supports the pivot point, which is made out of a large metal ball link. The fuselage uses four angle longerons, a few formers and balsa sheeting.

The motor is held by mounting formers front and rear. Because of the long fuselage and the two independent drive batteries, they needed 5 meters of cable! This adds weight and diminishes power, but proper CG location made it unavoidable.

Aad crafted the magnificent Duralumin landing gear. The U-shape frame pivots on a sprung and damped central post. The front axle slides in machined slots to provide directional control of the wheel.

Another special feature is the wing's variable sweep mechanism. Eric planned to use two servos, but they had insufficient torque. Instead, Aad made a special mechanism: a Speed 400 motor turning a worm gear drives a pair of sliders linked to the front wing spars to sweep the wings. With added electronics and its own battery, the mechanism is, in effect, a giant servo that works like a sail winch. The total sweep-angle change is 4.75 degrees; this produces a 1.6-inch movement in the CG (about 5 percent).

The radio is Multiplex's mc-3030 "Master Edition," with a DS9 double-conversion receiver and five servos: two each for aileron (also acting as elevator) and tip rudders, and one for the front wheel. The system also includes a powerful Schulze Dino AO-150 speed control (150 amps continuous) and two batteries.

## SPECIFICATIONS

**Model:** ⅓-scale Westland-Hill Pterodactyl Mk IV
**Wingspan:** 177 in.
**Length:** 68.5 in.
**Height:** 30.3 in.
**Wing area:** 3,035 sq. in.
**Mean wing sweep-back:** 40 degrees
**Takeoff weight:** 43 lb.
**Motor:** Plettenberg Dino 500-50-8
**Speed control:** Schulze Dino AO-150
**Battery:** 60 cells, Sanyo 1400 SCR (2x30 cells)
**Propeller:** scale de Havilland 24x10

### FLIGHT PERFORMANCE

The Pterodactyl flies incredibly well. The elevator is sensitive and the ailerons are a bit slow, but when used with the powerful rudder, maneuverability is on a par with that of any traditional sport model. Power is plentiful, producing impressive acceleration and a fast, steep (20+ degree) climb.

Even more surprising is the exceptional flight stability, but this is what the full-size aircraft was designed for. With full up-elevator, the Pterodactyl just mushes along, continuing straight and refusing to stall. The airbrakes are surprisingly effective, though; with both rudders deflected 25 degrees, the huge aircraft just stops flying and falls from the sky like a brick. Impressive!

At full power, the model takes off in less than 30 meters from an uneven grass runway. Landing requires elevator and power manipulation until the rear wheel touches the ground, then a touch of down-elevator settles the ship. With Sanyo 1400 SCR cells, flights usually last about six minutes.

After a few dozen flights and some fine-tuning, the Pterodactyl flies like a sport model, but it takes 20 to 30 minutes to assemble the giant at the field. Spectators love seeing the strange flyer so much that, despite the work, Eric and Aad are always happy to make one more flight to please the crowd. ÷